ASSESSING THE ADOPTION AND IMPACT OF ORGANIC AND FAIR TRADE CERTIFICATION OF PEPPER IN INDIA

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Fair-Trade-Regime und ökologische Landwirtschaftssysteme sind zwei Innovationen, die Marktnischen hervorrufen. Obwohl internationale Debatten seitens der Landwirtschaft über diese Systeme noch selten sind, beweisen die steigenden Verkaufszahlen von ökologischen und Fair Trade Produkten in den letzten Jahren, dass bei den Konsumenten eine zunehmende Nachfrage vorhanden ist. Daher stellt sich die Frage, ob Kleinbauern ausreichende Möglichkeiten und Anreize haben dem steigenden Bedarf der Konsumenten, vor allem hinsichtlich Sicherheits- und Qualitätsstandards sowie ethische Vorgaben, gerecht zu werden.

Fair Trade steht für die ethische Gewinnung und Vermarktung von Lebensmitteln. Der Begriff ökologisch wird mit hohen Sicherheits- und Qualitätsstandards hinsichtlich der Lebensmittel in Verbindung gebracht. Diese beiden Neuerungen können sich gegenseitig verstärken, da Fair Trade in Kombination mit ökologischen Produktionsstandards neue Märkte eröffnet. Die vorliegende Arbeit ist der Versuch, die ökonomischen Vorteile von ökologisch produzierten Waren unter Fair Trade Bedingungen am Falle des Pfeffers in Indien zu erforschen.

Indien verzeichnete in den Jahren 2003 bis 2004 eine Knappheitan Pfeffer. Die Produktion ging deutlich zurück und Indien, welches zuvor ein weltweiter Top Exporteur war, musste schließlich selbst Pfeffer importieren. Die Versorgung mit Pfeffer ist aufgrund der internationalen Preisschwankungen ebenfalls sehr instabil. Die Pfeffer produzierenden Kleinbauern waren am meisten von dieser Pfefferknappheit betroffen. Die ökologische Landwirtschaft und Fair Trade Handel wurde von einigen dieser Pfefferbauern als Lösung genutzt, um die Bodenfruchtbarkeit zu verbessern, die Produktion zu erhöhen und das Preisrisiko zu minimieren. Diese Strategie wird im Kontext mit der Leistungsfähigkeit von biologischem Anbau und Fair Trade-Marketing untersucht, um diese Pfefferproblematik anzugehen.

Vor diesem Hintergrund ist es das Ziel dieser Arbeit, die Einführung und die Auswirkungen des ökologischen Landbaus und der Fair Trade zertifiziertem Handel in Kombination zu analysieren. Die spezifischen Ziele der Arbeit sind: (a) Analyse des derzeitigen Standes der ökologischen Landwirtschaft und des Fair Trade in Entwicklungsländern; (b) die Auswirkungen der Übernahme des ökologischen Pfefferanbaus zu analysieren; (c) die relative Bedeutung der Panelmodelle bei der Übernahme von Bio-und Fair Trade-Regelungen und ihre Wirkungen auf

das Haushaltseinkommen zu prüfen; (d) die Wohlfahrtswirkungen dieser Zertifizierungssysteme in Kombination auf die Kleinbauernhaushalte zu studieren; und (e) die Wirkungen dieser Zertifizierung auf die Armutsreduzierung zu prüfen.

Diese Arbeit verwendet Panel-Daten von 300 Pfeffer-Kleinbauern im Bezirk Idukki, Kerala, die in den Jahren 2011 und 2012 erhoben wurden. In dieser Umfrage wurden die Daten aus den bisherigen Produktionsjahren 2010 und 2011 gesammelt. Speziell wurde eine detaillierte Haushaltsbefragung mit einem Fragebogen durchgeführt, in dem Haushaltsmerkmale, landwirtschaftliche Details und wirtschaftlicher Status abgefragt wurden.

Ein wesentlicher Beitrag dieser Arbeit [zur vorhandenen Literatur] ist es, die kombinierten Effekte von Bio- und Fair-Trade-Zertifizierungen in einem Entwicklungsland wie Indien zu studieren. Insbesondere untersucht die vorliegende Arbeit den Mehrwert der Fair Trade-Zertifizierung zusammen mit der Bio-Zertifizierung für die Entwicklung der ländlichen Kleinbauernhaushalte. Ein methodischer Beitrag dieser Arbeit ist es, den Mehrwert der Panel-Analyse bei der Identifizierung von Adoptions-Determinanten zu untersuchen, vor allem vor dem Hintergrund, dass die meisten Adoptionsstudien auf Querschnittsdaten basiert sind.

Eine wesentliche Erkenntnis ist, dass die ökologische Landwirtschaft als Strategie von vulnerabilen Haushalten mit geringeren Kapazitäten und Fähigkeiten genutzt werden kann, um die Produktivitätslücke zu den effizienteren Haushalte zu schließen.

Eine weitere Schlüsselerkenntnis dieser Arbeit ist, dass es sinnvoller ist, Vermögenswerte als Indikator zur Auswertung von Auswirkungen zu verwenden, vor allem, wenn eine Intervention erst vor kurzem in der Umfrageregion stattfand, wie es der Fall war, als Fair Trade erst im Jahr 2009 in Idukki eingeführt wurde.

Um den bestehenden Zustand der biologischen Landwirtschaft und Fair Trade Systemen in Entwicklungsländern zu verstehen, überprüft diese Arbeit die Hinweise über den Umfang dieser beiden Innovationen auf Grundlage der verfügbaren Literatur. Sie erforscht die Möglichkeiten und Beschränkungen der Vermarktung von ökologischen Produkten aus Entwicklungsländern unter Fair Trade Bedingungen. Das Konzept dieses Papiers bietet eine Grundlage, um prüfbare Hypothesen bezüglich der beiden Innovationen zu generieren.

Um die Auswirkungen der Adoption organischer Anbauweise auf die Pfefferproduktion zu untersuchen, wird ein endogenes Switching-Regressionsmodell angewendet, um die Heterogenität der Adoptionsentscheidungen zu berücksichtigen. Darüber hinaus wird auch eine kontrafaktische Teilnahmeeffekt-Analyse durchgeführt, um die Wirkung der Adoption auf die Produktionsmenge zu ermitteln. Die Ergebnisse der Teilnahmeeffekte zeigen, dass Teilnehmer bessere Erträge erzielen. Aber Nicht-Teilnehmerr werden am meisten davon profitieren, wenn sie ökologische Produktion einsetzen.

Zur Untersuchung der vergleichenden Leistung eines Panel-Modells bei der Modellierung von Adoptionsentscheidungen für ökologische Produktion oder kombiniert mit Fair Trade, wurden zwei Modelle angewendet, nämlich (i) eine multinominales querschnittsbasiertes Logit-Modell - nach Erhebungsjahren getrennt - und (ii) ein multinominales (Random effects) Logit-Modell, basierend auf Paneldaten mit verallgemeinerten, linearen 'latent und gemischt' Modellen. Das Panel Adoptionsmodell hilft dabei, die Berechnungen trotz ausgelassener/fehlender Variablen, die sich durch unbeobachtete Heterogenität und Scheinkorrelationen ergeben,durchzuführen.

Zur Messung der Auswirkungen der Adoption wird Propensity Score Matching (PSM) mit multiplen Teilnahmeseffekten verwendet, begleitet von einer Sensivitätsanalyse, um die Robustheit der Ergebnisse zu testen. Die Ergebnisse legen nahe, dass Betriebsgröße und Marktentfernung die wichtigsten Faktoren sind, die eine Adoption beeinflussen. Die gefundenen Effekte ergaben, dass zertifizierte Bio-Bauern ein deutlich höheres Einkommen haben, aber die Beteiligung an Fair-Trade-Organisationen scheinen keine zusätzlichen Vorteile zu verschaffen .

Zur weiteren Untersuchung der Steigerung des Wohlstands der Haushalte durch fairen Handel mittels Bio-Zertifizierung wird eine multinominaleendogene Switching- Regression zusammen mit einer kontrafaktischen Analyse verwendet. Die Wirkung dieser Zertifizierungen auf die Armutsminderung wird ebenfalls bewertet. Die Ergebnisse zeigen, dass die Zertifizierung einen signifikanten Einfluss auf das Einkommen hat. Allerdings, auch wenn die Mitgliedschaft in Fair-Trade-Systemen keinen Beitrag zum aktuellen Einkommen leistet, so reduziert sie Risiken und Armut dadurch, dass die permanente Einkommensituation verbessert und somit langfristig der Wohlstand der Bio-Bauern erreicht wird.

Zusammenfassend stellt diese Arbeit fest, dass die ökologische Landwirtschaft das Potenzial hat, die indischen Pfefferproduktion zu steigern und damit die Möglichkeit, in Zukunft weniger abhängig von Exporten zu sein. Darüber hinaus sind diese beiden Zertifizierungssysteme gegenüber herkömmlichen Methoden der Produktion und des Agrarmarketing in der Lage, zusätzliche Erträge zu erzielen. Obwohl diese Arbeit annimmt, dass sich potenzielle Vorteile ergeben, wenn Bio- und Fair-Trade -Zertifizierungen in Kombination angewendet werden, ist jedoch festzuhalten, dass sich zusätzliche Erträge für Bio-Bauern bei Anwendung von Fair Trade Zertifizierungen nicht unmittelbar ergeben.

Fairer Handel hat das Potenzial, um mit der Zeit zusätzliche Vorteile für Bio-Bauern zu schaffen und damit langfristig bessere Lebensbedingungen. Um diese Ergebnisse zu untermauern erfordert die kombinierte Einführung von Fair-Trade- und Bio-Zertifizierung weitere Studien. Darüber hinaus sollten die politischen Entscheidungsträger zur Kenntnis nehmen, dass diese beiden Innovationen zur Linderung der Armut beitragen. Die verschiedenen Institutionen und Akteure müssen mehr Bewusstsein für und Zugänglichkeit zu diesen Systemen für die abgelegen lebende, arme Landbevölkerung in den Entwicklungsländern schaffen.

Stichworter: Adoption, Armut, Auswirkungen, Fair Handels, ökologische Landwirtschaft

ABSTRACT

Fair trade regimes and organic agricultural systems are two innovations that are considered to cater to niche markets. Though international agricultural debates on these systems are lacking, organic and fair trade markets have steadily witnessed increasing sales in the recent years indicating a sustained and growing consumer demand for these produce. This therefore merits assessing if smallholder and marginal farmers have the necessary capability and incentive to meet the growing consumer demands on the emerging standards of safety, quality and ethics of food supply.

Fair trade pertains to ethics of food marketing and organic relates to food safety and quality. Both innovations can be mutually reinforcing as fair trade often combined with organic production standards opens up new market prospects. This thesis is an attempt to study the combined economic benefits of organically produced commodities marketed under fair trade systems for smallholder producers using the case of pepper in India.

India is faced with a pepper scarcity from 2003-04. Its production declined and from being a top world exporter, India started to import pepper. The supply of pepper is also unstable due to fluctuations in its international prices. The smallholder pepper farmers were the most affected in this pepper shortage. Organic agriculture and fair trade marketing systems was used as a solution by some of these pepper growers to improve soil fertility, increase production and minimize price risk. This choice is explored in the context of the ability of organic cultivation and fair trade marketing to address these pepper issues.

In this context, the objective of the thesis is to analyze the adoption and impact of organic agriculture and fair trade certification systems in combination. The specific objectives of the thesis are: (a) To understand the current status of organic agriculture and fair trade systems in developing countries; (b) To analyze the impact of organic adoption on production; (c) To examine the relative merit of panel models in the adoption of organic and fair trade arrangements and its consequent impact on household income; (d) To study the welfare impacts of these certification systems in combination on the smallholder farm households; and (e) To examine the effects of these certifications on poverty mitigation.

This thesis uses a panel data set collected from 300 smallholder pepper farmers in Idukki district, Kerala during 2011 and 2012. In this survey, data pertaining to the previous production years 2010 and 2011 were obtained. In particular a detailed household survey was conducted with the questionnaire covering aspects from household characteristics, agricultural details and economic status.

An important contribution of this thesis to literature is to study the combined effects of organic and fair trade certifications in a developing country like India. In particular, this thesis examines the added value of fair trade certification along with organic certification for the development of rural smallholder farm households. A methodological contribution of this thesis is to examine the added value of panel analysis in identifying adoption determinants as most adoption studies are based on cross section data. A crucial learning is that organic farming can be used as a strategy by vulnerable households with less capacity and skills to close the productivity gap with the more efficient households. Another key learning from this work is that it is better to use assets as an indicator to evaluate impact, especially when an intervention was only recently introduced in the survey region, as was the case with fair trade which was only introduced in 2009 in Idukki.

To understand the existing state of organic agriculture and fair trade systems in developing countries, this work reviews the evidence of the magnitude of both these innovations based on available literature. It explores the opportunities and constraints of marketing organic products from developing countries under fair trade regimes. The framework built in this paper provides a base to generate testable hypotheses regarding the two innovations.

To examine the impact of organic adoption on pepper production, an endogenous switching regression model is applied to account for heterogeneity in adoption decision. In addition to this, a counterfactual treatment effect analysis is also done to ascertain the effect of adoption on production quantity. Results from the treatment effects show that adopters have a better yield. But non-adopters will benefit the most if they implement organic production.

To examine the comparative merit of a panel model in modelling organic and both organic and fair trade adoption decisions, two adoption models namely, (i) a multinomial cross-section logit applied for both survey years separately and (ii) a multinomial random effects logit model based on panel data using generalized linear latent and mixed models are used.

The panel adoption model helps to control for omitted variable bias arising due to unobserved heterogeneity and spurious correlations. To measure the differential gain of adoption, propensity score matching with multiple treatment effects is used accompanied by sensitivity analysis to test robustness of impact results. Results suggest that farm size and market distance are the major factors that influence adoption. Impact findings show that certified organic farmers have a significantly higher income but participation in fair trade regimes does not seem to generate additional benefits.

To further examine the additional benefit of fair trade over organic certification on household welfare, a multinomial endogenous switching regression along with a counterfactual analysis is used. The effect of these certifications on poverty mitigation is also assessed. Results show that certification has a significant impact on income. However, though membership in fair trade marketing systems does not contribute to current income, it reduces risk and thereby improves the permanent income and the long term welfare of organic farmers and thus reduces poverty.

To summarize, this study finds that organic agriculture does have the potential to increase Indian pepper production and thereby the possibility to be less dependent on exports in the future. Moreover, both these certification systems are capable of generating additional income than the conventional methods of production and agricultural marketing. Though this thesis submits that there are potential benefits if organic and fair trade certifications are adopted in combination, nevertheless it needs to be noted that additional benefits for organic farmers on adoption of fair trade certifications are not immediate. Fair trade has the potential to extend additional benefits to organic farmers with time leading to long term welfare. Hence, the combined introduction of fair trade and organic certification requires more studies to establish these results. Furthermore, policy makers should take note of the fact that both these innovations contribute in alleviating poverty. Therefore, the different institutions and players involved, need to create more awareness and accessibility of these systems to the remote and rural poor in the developing countries.

Keywords: adoption, fair trade, impact, organic farming, poverty

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LIST OF ABBREVIATIONS

ADB	Asian Development Bank
ATT	Average Treatment Effects on the Treated
ATU	Average Treatment Effects on the Untreated
DMF	Normalized Dubin McFadden model
ENVIS	Environmental Information System
ESD	Economics and Statistics Department
FAO	Food and Agriculture Organization
FGT	Foster Greer Thorbecke
FIML	Full Information Maximum Likelihood
FLO	Fairtrade International
FLOCERT	Fairtrade Labelling Organizations International
GLLAMM	Generalized Linear Latent and Mixed Models
Ha	Hectare
IFAD	International Fund for Agricultural Development
IFOAM	International Federation of Organic Agriculture Movement
IIA	Independence of Irrelevant Alternatives
INR	Indian Rupee
ISO	International Organization for Standardization
Kg	Kilogram
Km	Kilometer
MT	Metric Tones
NGO	Non-Government Organisation
PDS	Peermade Development Society
PPP	Purchasing Power Parity
PSM	Propensity Score Matching
SADC	Southern African Development Community
SBI	Spices Board of India
USD	United States Dollar

CHAPTER 1

INTRODUCTION

1.1 Background of the study

1.1.1 Global Outlook on Fair Trade and Organic Agriculture

After the Brundtland Commission coined the term "sustainable development" in its 1987 report, *Our Common Future;* this approach has increasingly gained global prominence. The awareness concerning economic development, social equity and environmental protection has grown many folds. The concept relating to agriculture and rural development has been a center of many discussions among the supporters and skeptics of sustainability. In this context ethical aspects of production and agricultural marketing like organic agriculture and fair trade have been discussed.

In global agricultural debates, certification systems like fair trade and organic farming are considered niche markets. Fair trade certification is used as a unique selling proposition in markets like coffee, banana, cocoa, mango and traditional handicrafts. Organic certification is more centered on high value markets like cotton, tea, coffee and spices. In the recent years, the organic markets for fruits and vegetables have also captured consumer interest in the developed nations. Though extensive agricultural debates on these subjects is lacking, both these certification systems provide a possibility for agriculture to diversify into non-traditional methods of production and agricultural marketing.

The idea of fair trade has its roots in world trade. Nevertheless, it has opened new agricultural market prospects. The inherent strength and advantage of a fair trade certification for agricultural produce is in providing a rural, poor and remote smallholder farmer access to global markets. It has the potential to provide development opportunities and better living conditions for poor farmers in developing countries.

On the other hand, organic agriculture is a technical innovation that is believed to be environmentally friendly and ecologically sustainable. However it is viewed as an infeasible strategy for global agriculture due to food security aspects. The arguments against organic agriculture in meeting global food supply demands are predominantly low yields (Rigby and Caceres, 2001). Nevertheless, organic produce has a niche market in the developed world for its food safety and quality.

The global market for both these innovations is rapidly growing. The global sales of fair trade was 6.6 billion US$ in 2012 (Fairtrade International, 2012-13). The global market size of organic produce has increased three folds in the last ten years and was valued at 59 billion US$ in 2010 (Willer and Kilcher (Eds), 2012). Though these products are assumed to cater to ethically and environmentally conscious consumers who are considered a minority, these sales figures indicate that their number has been increasing in the recent years. These expanding markets and growing sales indicates sustained and increasing consumer demand for these certified commodities. This thus merits assessing if it is technically and economically feasible to meet these growing consumer demands on the standard of food safety, quality and ethics, especially by the smallholder and marginal producers. Therefore, perhaps it is time to study these certification systems as emerging areas of agricultural research and address the gaps in this literature.

Both these certification systems critique conventional agriculture and seek to create an eco-friendly agronomy and smallholder producer development (Raynolds, 2000). While fair trade as a movement generated from developing countries, organic agriculture took its birth in the developed nations. Both these certification systems cater to different aspects of agriculture, where organic is production specific; fair trade relates to marketing of farm produce.

Literature deliberates on organic farming and fair trade regimes. Some prominent examples include Browne, et. al (2000), Rice (2001), Raynolds (2004), Calo and Wise (2005), Bacon and (2008). Though combining these innovations helps in reducing farmer´s livelihood vulnerability (Bacon, 2005), it is also contended that such certification systems alone do not provide clear advantages to smallholder farmers (Valkila, 2009). However, the question remains if adopting both these certification systems together can contribute to the agricultural and socio-economic development of smallholder producers in developing countries. Hence,

this dissertation contributes to these arguments and builds the gap in literature by analysing whether adopting fair trade and organic certification in combination can benefit smallholder producers.

While most of the studies pertaining to organic agriculture and fair trade networks look at coffee (e.g. Giovannucci and Ponte, 2005), there are a few that look at banana (e.g. Shreck, 2002). Fair trade impact studies have been predominantly considered in the developing countries of the continents of Africa and Latin America. Some eminent works include Becchetti and Costantino (2008) in Kenya and Taylor (2005) in Mexico. In this work, the aim is to build this second gap in literature by focusing on a developing country in Asia.

1.1.2 The Indian Pepper Scenario

In this regard, the case of pepper in India is studied. India is faced with a pepper scarcity from 2003-04. Its production declined from 76000 metric tons in 1999 to 51000 MT in 2010 (FAO, 2010). Due to this, from being a top world exporter, India started to import pepper to meet its domestic demand (Jerome, 2009). The supply of black pepper is highly volatile in the global market and hence has huge price fluctuations. Because of its dependence on imports, the domestic pepper in India is affected by the fluctuations in international prices. The domestic prices declined to Indian Rupees (INR) 74/kg from a peak of INR 215/kg in 1999-2000. Hence, the production of pepper has become unremunerative due to depressed prices in the domestic and/or global markets coupled with increasing input costs. In addition to this, the productivity of pepper also declined due to poor farm management, incidence of diseases and pests, depletion of soil fertility and scattered cultivation by small holders (Hema et. al, 2007 and Gafoor et. al, 2007). The Indian smallholder pepper farmers were the most affected in this domestic pepper scarcity. Organic agriculture and fair trade systems were used as a solution by some of these pepper growers to improve soil fertility, increase production, to tide over market price oscillations and improve their economic well-being.

However, it needs to be noted that though fair trade was introduced in India at least three decades ago, hardly any studies are available from the aspect of Indian agriculture that look at fair trade impacts. Organic agriculture was only recognized by the Indian Government in 2000. The Indian organic farming literature is dominated with works on cotton (e.g. Eyhorn et, al, 2007). There are also some studies like Ramesh, et. al (2005) that analyze organic

farming as a development vehicle in India. Nevertheless, it still remains a largely untraveled area in Indian agricultural literature. Therefore this work contributes to bridge this third gap by understanding the organic agriculture and fair trade networks in India as a solution to the domestic pepper scarcity. To sum up, this dissertation analyzes the adoption and its impact of choosing to produce organic and both organic and fair trade certified pepper by rural smallholder producers in India.

1.2 Research Objectives

The overall research objective is to identify the drivers of adoption of social and environmental certification schemes in agriculture in developing countries and assess its welfare impacts using the case of organic and fair trade certified pepper in India. There are five specific research objectives as outlined in the following:

First: to understand if having an additional fair trade certification along with organic certification is beneficial for the farmers. Hence, the prospects and limitations of marketing organic products from developing countries under fair trade regimes are reviewed. Based on this review, an inferable and confirmable framework is constructed to understand the impact of adopting organic agriculture and fair trade in combination in developing countries.

The above postulated hypothesis is then tested in the context of the pepper crop in India. Hence, the second to fifth research objectives elaborate on whether combining organic agriculture and fair trade systems can contribute in addressing the problems of pepper in India and thereby economically beneficial for smallholder producers in developing countries.

Second: to understand whether India can increase its pepper production to meet domestic demand through organic farming. In this regard, the impact of organic farming on pepper quantity produced per hectare is analyzed. By allowing for unobserved heterogeneity to affect adoption decisions, the impact analysis can also capture unobserved impacts of organic farming on production.

Third: to examine the comparative merit of modelling adoption decisions using panel data and to understand the factors that influence smallholder pepper growers to adopt both organic and fair trade certification systems in combination. By accounting for self-selection bias and the

problem of endogeneity through a panel analysis, this adoption model can effectively capture the determinants of organic and fair trade adoption. This part of the study is aimed in helping policy makers to frame procedures that better serve and encourage farmers to consider the joint adoption of technical and institutional innovations in agriculture in India.

Fourth: to establish the impact of organic and fair trade certification of pepper on the welfare of smallholder farmers in India. The welfare analysis is studied in terms of income, consumption expenditures and assets. This impact assessment will establish if the combined adoption of organic farming and fair trade marketing is economically beneficial and can increase income of the smallholder pepper farmers in India.

Fifth: to examine the effects of organic and fair trade certification of pepper on poverty in Idukki district, Kerala, where pepper is predominately grown in India. In this area, around 75% of the households are below poverty line (Prakash, 2008). Moreover most of these poor households are dependent on agriculture and pepper is a major crop for them. Hence, certification effects on poverty will be assessed if organic and fair trade pepper certification is likely to be an effective means of poverty reduction.

By answering the research questions set by each specific objective recommendations can be developed to provide workable solutions to the problems of pepper in India. The findings from this dissertation can provide important lessons for policy makers who are interested in promoting socially and environmentally sustainable agriculture in developing countries.

This thesis also contributes towards advancing methodological aspects of adoption and impact studies by developing a panel model for adoption. Most adoption studies in the literature are based on cross-section data. An important finding of this study is that adoption of organic farming can be used as a strategy by those households that have less capacity and skills to increase production and meet the productivity standards of the less vulnerable households. Another important finding is that when examining the impact of an intervention recently introduced in a developing country as is the case with fair trade in this study; it is better to measure household welfare in terms of assets. Assets better reflect consumption expenditures and disposable income in the long run as pointed out by Friedman´s permanent income hypothesis (1957).

1.3 General Framework of Thesis

In this work, the focus is on farm level production and marketing of pepper and not on the consumer and demand side of organic and fair trade marketing. It also needs to be noted that the certification costs concerning the two innovations are initially borne by the non-government organization (NGO) named Peermade Development Society (PDS), operating in the study region of Idukki and not at the farm level. Organic certification costs are based on the size of land and fair trade certification costs are based on the number of farm households practicing fair trade marketing through the NGO. These costs are then recovered by the NGO by reducing the market price of the certified products. The role of the NGO in these certification schemes will be elaborated in detail in chapter 3.

Hence, addressing the lead research objectives requires an understanding of how organic fair trade fits into the livelihood strategy of a farm household. This demands that approaching the research questions means entering into the complex system of farm households. In order to identify a suitable approach that will lead to relevant answers, the design of an analytical framework is considered essential. Any new agricultural certification system will only be considered if it fits into to the livelihood strategy of the farm household. In this regard, a modified version of the Sustainable Livelihoods (SL) framework (DFID, 1999) as depicted in figure 1.1 is adapted. This modified SL-Framework differs from the original SL-Framework in the aspect that it specifically considers this framework in the context of adoption and welfare impacts of socially and environmentally sustainable agriculture in developing countries, especially India. More specifically, in this thesis, it is used as an evaluation strategy of agricultural technology adoption in developing countries.

The SL-Framework adapted in this research presents the livelihood aspects of the farm household through the livelihood assets that include human, natural, financial, physical and social capital. In this work, human capital refers to the age, farm experience, household size, dependency ratio and years of education of the farmers and natural capital pertains to farm size and irrigation access. Financial capital includes access to credit, owning wealth such as livestock and farm and off-farm income. Social capital represents the support that the farmers receive through infrastructure and access to markets. Social networks also influences perception and attitudes the farmers develop towards an agricultural innovation.

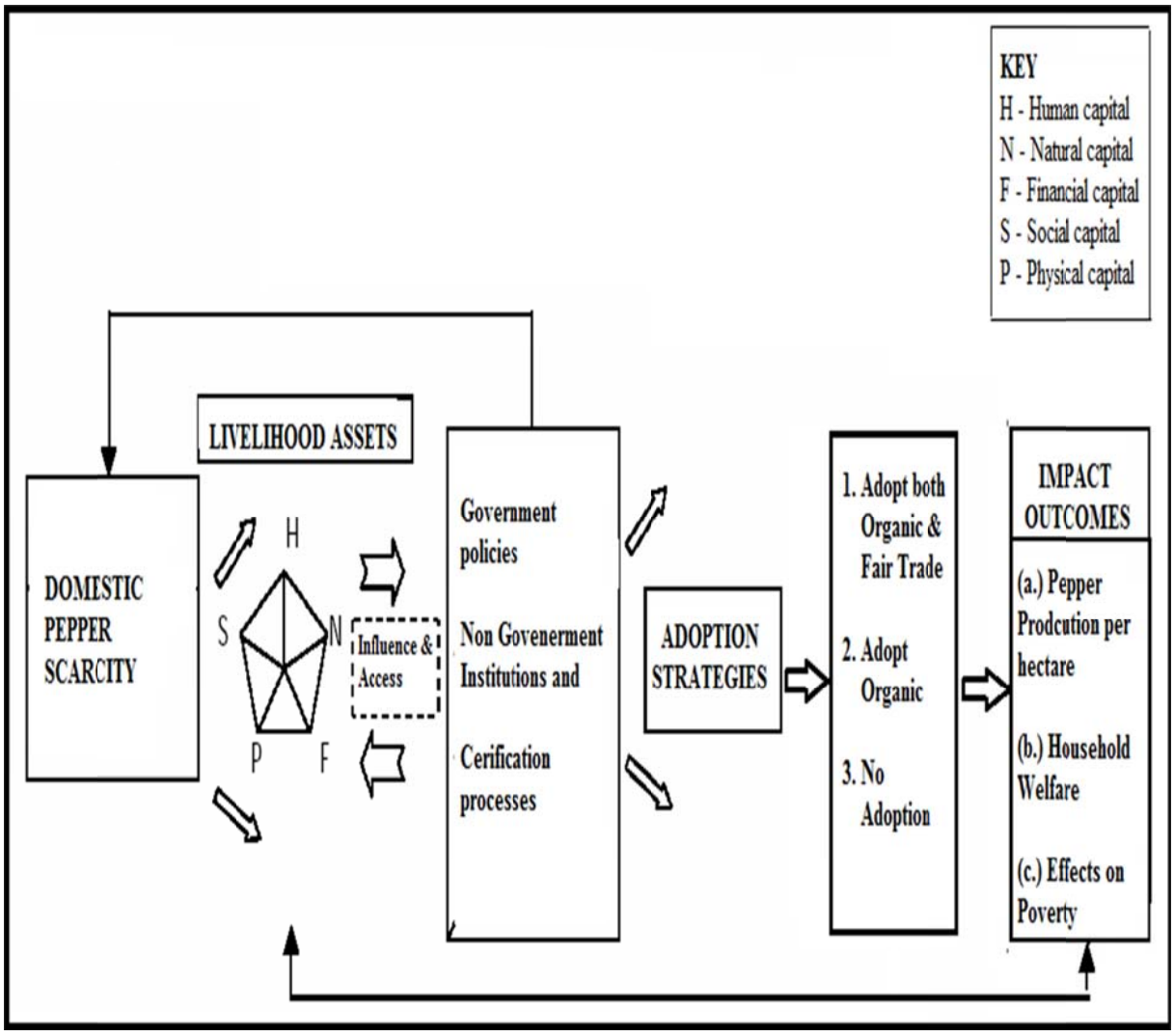


Figure 1.1: Sustainable Livelihoods Framework (DFID, 1999), *Modified*

These livelihood assets are also affected by the vulnerability context such as a pepper scarcity in this case. The SL-Framework combines at the micro-level the different forms of farm livelihood capitals with the macro-level government policies, non-government institutions and certification processes. In this study government policies are attributed to the help received, in both cash and kind like technical support and training from extension support services. Non-Governement institutions and certification processes refer to the role played by PDS in the study region and the organic and fair trade certification processes offered by them.

Farm households choose a livelihood strategy depending on their asset capitals and vulnerability contexts. In this study the livelihood strategy options available to the farmers are choosing namely; (a) both organic and fair trade certified farming, (b) only organic farming and (c) no adoption. They expect certain livelihood outcomes from the chosen strategy concerning yield and welfare. However, the actual livelihood outcome may be different from the anticipated effect and it again feeds back into the asset livelihood base. Hence, based on this modified SL-Framework, the adoption approach and the impact assessment methods are developed.

A panel data, generated from 300 smallholder pepper farmers in Idukki, India from household surveys conducted in 2011 and 2012 is used to empirically study the modified SL-Framework. The data collection is presented in detail in chapter three. The results will help to identify the determinants of adoption and ascertain the welfare impacts of organic and both organic and fair trade certification.

1.4 Outline of the thesis

This thesis is based on the overview of papers presented in table 1.1 and is organized into chapters as follows:

The next chapter presents the state of organic and fair trade in the developing countries of Asia, Africa and Latin America. In particular section 2.1 gives an introduction to organic agriculture and fair trade marketing. Section 2.2 looks at the state of fair trade and organic agriculture in developing countries in detail followed by theoretical arguments on the advantage of smallholders combining organic and fair trade certification elaborated in section 2.3. The details on why the Indian case study of pepper is considered appropriate to test this hypothesis are discussed in section 2.4 and section 2.5 concludes with a summary.

In chapter three, the data collection procedure is presented. Section 3.1 describes the study area and on the reasons for choosing Idukki district, Kerala. Section 3.2 and 3.3 elucidates the sampling method and the survey instrument used for collecting data from 300 smallholder pepper farmers. Section 3.4 describes the implementation of the data collection procedure and section 3.5 summarizes this section.

Table 1.1: Overview of papers produced from this dissertation

S. No	Title of the Paper	Comments
Paper 1 *(elaborated in chapter 2)*	Fair Trade and Organic Agriculture: A Review *(addresses objective 1)*	Published in 2013 in the Journal of International Food and Agribusiness Marketing, 25(4), Pg. 311-323. Won the best paper Award at the International Food Marketing Research Symposium held in Philadelphia, United States, June 21-22, 2012.
Paper 2 *(elaborated in chapter 4)*	Impact of Organic Pepper Adoption on Production: A Counterfactual Analysis from India *(addresses objective 2)*	Working paper
Paper 3 *(elaborated in chapter 5)*	Adoption and Impact of Organic and Fair Trade Certification of Pepper in India *(addresses objective 3)*	Paper submitted to Quarterly Journal of International Agriculture Paper presented in Tropentag 2013 held at Univsersität Hohenheim
Paper 4 *(elaborated in chapter 6)*	Welfare Impacts of Organic and Fair Trade Pepper Certification of Rural Smallholders in India *(addresses objectives 4 and 5)*	Paper to be presented in the International Conference of the Courant Research Center and the Ibero America Institute 2014 on Poverty, Equity and Growth in Developing countries to be held in Göttingen from July 2-4, 2014

Source: Own illustration

Chapter four analyses the impact of organic adoption on production. It uses cross-section data collected during the household survey in 2012 and analyses the impact of organic adoption on pepper quantity produced per hectare. To control for self-selection bias, the determinants of organic adoption are first ascertained and then the production impact results based on observables and unobservables are estimated thus overcoming problems of endogeneity. The counterfactual analysis of the impact of organic certification on production is also discussed.

Chapter five deals with the determination of the main drivers of organic and fair trade adoption of pepper and its impact on income of the smallholder household. Both a cross-section analysis applied to each year and a panel analysis is used to compare if a panel model is better in identifying adoption determinants. The impact of adoption on income is deciphered by employing a multiple treatment propensity score matching method.

Chapter six elaborates on the welfare impacts and poverty effects of adopting organic and fair trade certification by smallholder pepper farmers in India. Welfare is measured based on income, consumption expenditures and assets. An endogenous multinomial switching regression model is used to ascertain impact on the three measures of welfare. The certification effects on the welfare of smallholder pepper household are discussed in detail using a counterfactual analysis. To deepen the welfare analysis, a poverty regression is also estimated to analyze the effects of certification on poverty.

Chapter seven provides a synthesis of this dissertation, summarizing the results, drawing conclusions and submitting recommendations.

CHAPTER 2

FAIR TRADE AND ORGANIC AGRICULTURE IN DEVELPOING COUNTRIES: A REVIEW[1]

This chapter is a journal paper published by Priyanka Parvathi & Hermann Waibel (2013). Fair Trade and Organic Agriculture in Developing Countries: A Review, Journal of International Food & Agribusiness Marketing, 25:4, 311-323, DOI: 10.1080/08974438.2013.736043

The link to access this article is as below:
http://dx.doi.org/10.1080/08974438.2013.736043

[1]. This paper also won the best paper Award at the International Food Marketing Research Symposium held in Philadelphia, United States, June 21-22, 2012.

CHAPTER 3

DATA COLLECTION

3.1 Study area

The primary cultivation of pepper in India was done in the Malabar Coast (presently the state of Kerala). Kerala produces nearly 96% of the pepper production in India. Pepper farming is the major source of income and employment for around two million households in the region (Hema, et. al, 2007). Karnataka and Tamil Nadu are the other major pepper producing states in the country.

The commonly observed cultivation system in Kerala is the "extensive homestead cultivation" where pepper cultivation is taken up as a secondary crop interspersed with several other crops. Pepper is a perennial tropical crop and attaches itself to trees or fences by means of aerial roots. It does not grow below 12 degree centigrade. Mountainous regions around 1500 meters above sea level with moderate winter are suitable for pepper cultivation. It also requires adequate rainfall and water holding capacity of the soil.

The core pepper production centre in Kerala is Idukki district. It is the largest among the 14 districts of Kerala. The region is covered with mountains and dense forests and does not have any rail or air connections. It can only be reached by road. The district is known for its high literacy rate which is around 92.2% though it also has a high incidence of poverty. More than 75% of households in Idukki live below the poverty line (Prakash, 2008).

The climatic and soil conditions required by the pepper plant are naturally available in the mountains of Idukki. Agriculture is the main occupation for the households in this district followed by dairy. The agro-climatic condition in Idukki is suitable for growing tea, coffee,

rubber, coconut, cardamom and pepper. This district has mostly small and marginal farmers. However, in highland areas tea and cardamom plantations owned by corporate or private agencies are also present.

Idukki has 37.92% of the total pepper area of Kerala (SBI, 2008). In this district, pepper alone contributes around 20% to total agricultural income (ESD, 2011). In Idukki pepper is grown as a mixed crop with other crops like cardamom, coffee, rubber, turmeric, ginger, coconut, cloves and vanilla. Udumbanchola and Peerumedu are the major taluks[2] that grow pepper in Idukki. Hence data was collected from these two regions of Idukki. The maps of these regions are presented in figure 3.1 below.

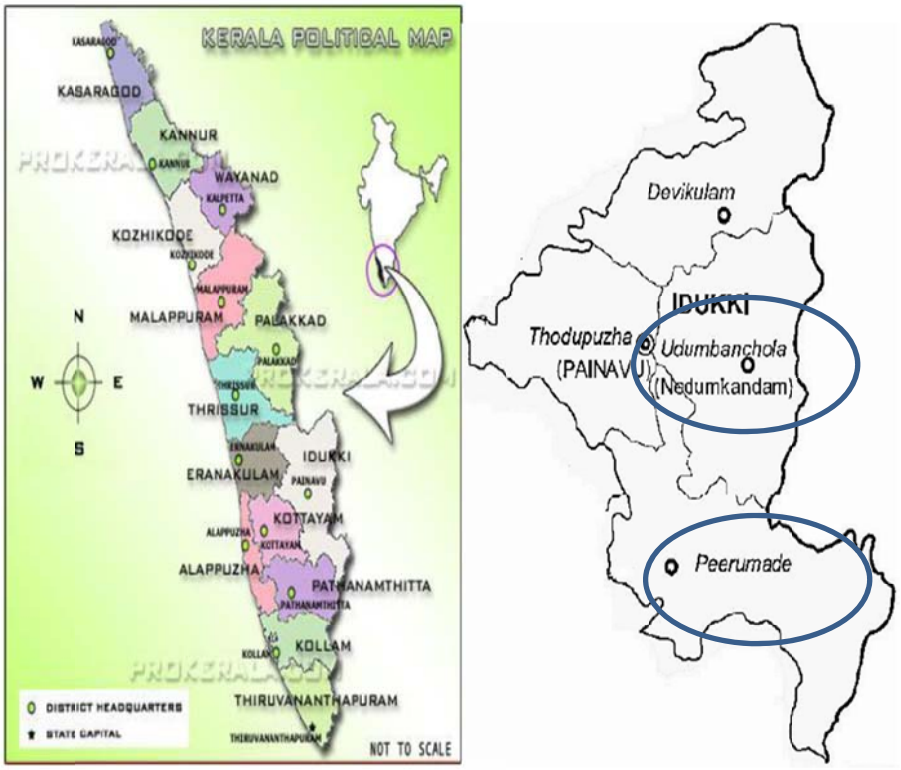


Figure 3.1: Study Area
Source: http://2.bp.blogspot.com/--kerala-political-map.jpg

[2] Taluk is an administrative division of the district. It is like an entity of the local government and has certain fiscal and administrative powers over the villages and municipalities coming under its jurisdiction

Udumbanchola is the largest taluk in Idukki with 23 villages. Peerumedu has a total of 10 villages. Both these regions share identical topography and climatic conditions. They experience moderate rainfall and not much seasonal variation is observed in both these regions.

3.2 Sampling

A two stage stratified random sampling method was employed. This is to ensure that there was adequate representation of conventional, organic and both organic and fair trade farmers in the sample. In the first stage, a list of conventional smallholder pepper farmers with less than five hectares of land operating in Udumbanchola and Peerumedu was collected from the agricultural office of the Idukki district. Peermade Development Society (PDS), the largest organic and fair trade promoting NGO in Idukki district was approached to get the list of certified farmers. The organic spices division of PDS provided the list of smallholder organic and both organic and fair trade certified farmers with less than five hectares of land in the regions of Udumbanchola and Peerumedu.

It was observed in these lists that Udumbanchola had more than 90% of conventional pepper farmers. Organic and both organic and fair trade certified pepper smallholder growers were predominant in Peerumedu. This could be because as PDS is situated in Peerumedu; it is more active in that region.

In the next stage, to the lists obtained from the first stage, random sampling was employed and 100 farmers for each of the management regime category as mentioned in chapter 2 were selected namely; (a.) 100 conventional, (b.) 100 organic and (c.) 100 both organic and fair trade. In terms of village level sampling, a total of 14 villages were randomly selected from these two taluks, 9 villages in Udumbanchola and 5 villages in Peerumedu. It needs to be noted that no village had all three categories of farmers. However, most of the villages had a mix of two groups of farmer namely; (a.) organic and conventional (b.) organic fair trade and conventional and (c.) organic and organic fair trade. Hence, these villages though not exactly but were adequately representative of all the categories of farmers in the two regions. Following this sampling, data was collected from 300 pepper farm households in 2011. In 2012, there was an attrition of 3 farmers in the conventional farming category and hence, data was collected from 297 households. It was also observed that there was no late-adoption or

dis-adoption in 2012 sample for all the categories. Moreover fair trade was noted to be only recently introduced in the study region in 2009.

3.3 Survey Instrument

A structured questionnaire (Appendix B and Appendix C[3]) was used to collect data. Some of the major sections covered in the questionnaire included household characteristics, agricultural activities, household income, consumption expenditures, assets and a detailed section pertaining to organic and fair trade certified farming. All the details as mentioned in the livelihood framework approach (chapter 1) employed in this thesis was given due consideration and data was collected accordingly. The data collected in 2011 and 2012 pertains to production years 2010 and 2011 respectively.

Household characteristics pertain to information relating to household dependency ratio, age, education, farm experience etc. The agricultural details section captures information on the variety of crops grown by the household, their farm size, total production of each crop, quantity used for home consumption, quantity used for sales along with it sales price. The distance travelled from the farm to market was also obtained. This section also covered in detail the expenses incurred during the various stages of production from land preparation to applying fertilizers and manures to harvest. Labor and irrigation expenses were also noted.

To ascertain total household income, data was collected relating to both on farm and non-farm income generating activities. On farm activities included income earned from livestock agriculture and non-farm included wage employment, non-farm business, other forms of self-employment and any additional income received during the year in the form of public transfers or insurance compensations.

Household consumption expenditures comprise both food and non-food expenses including interest paid on borrowings. Assets included both household assets and production assets. This was complemented by the information ascertained from land and livestock asset from the agricultural section.

[3] This questionnaire is a modified form of the household survey questionnaire of the project Vulnerability in Southeast Asia (DFG Research Unit FOR 756) with additional section on Organic and fair trade certification in India.

A detailed section pertaining to the organic and fair trade details of the household was collected. A separate sub-section was designed to collect specific information from conventional, organic and organic fair trade farmers respectively. Information relating to reasons for their specific choice of farming, awareness regarding organic and fair trade systems and their perceptions regarding the same was ascertained.

3.4 Implementation of data collection

A pre-testing of questionnaire was conducted by interviewing small holder pepper farm households not present in the study area. This procedure was applied to improve the quality of the questionnaire and interview efficiency.

PDS organics provided their field staff as enumerators for the study. Thus, we had seven enumerators from PDS. An additional five enumerators were selected from Kerala agricultural university. All the selected enumerators were trained for three days on the objective of the study, the procedure of the survey and the details of the questionnaire.

The household surveys were done in the months of March and April in 2011 and 2012 respectively. This period was particularly selected as the peak harvest season in Idukki for pepper was January and February. This ensured that farmers had time to answer the questionnaire. In Idukki, the house is also situated on the farm. This helped the enumerators to check household composition and asset base. In almost 95% of the sampled households the interviewee was the male household head. The wife was also present in the interview and most often, she answered on information relating to consumption expenditure which was corroborated with the household head. This enabled to get more accurate information on expenses as normally the women take care of household expenses in Idukki. Initially the interviews took around three hours but once the enumerators got more familiar with the questionnaire the average interview time was one hour.

3.5 Summary

This study took place in the two regions of Udumbanchola and Peerumedu in Idukki district, Kerala state, India. The data from these surveys are used to analyze the adoption and impact of organic and fair trade certified pepper. This chapter lays the foundation for conducting the

empirical analysis in chapters 4, 5 and 6. In particular chapter 4 uses the agricultural activities and household characteristics to ascertain impact of organic adoption on production and yield. Chapter 5 studies the livelihood related aspects of the households and analysis the factors of organic fair trade adoption and its impact on income based on observable farm household characteristics. Chapter 6 examines the welfare impact in terms of household income, consumption expenditures and assets as a result of organic and fair trade adoption. It also analyses the effect of these certifications on poverty. Hence, the data collected from this survey is effectively employed to the modified sustainable livelihoods framework presented in chapter 1.

CHAPTER 4

IMPACT OF ORGANIC PEPPER ADOPTION ON PRODUCTION: A COUNTERFACTUAL ANALYSIS FROM INDIA

This chapter specifically addresses the second research objective of the thesis on whether organic adoption of pepper increases its production. It explores if organic adoption can be a solution to help India meets its domestic pepper demand.

4.1 Introduction

Sustainable agriculture always debates the ability of organic farming to increase production. Given the fast growing human population, the significance of food security is a critical aspect of this discussion. The arguments against organic agriculture being a solution to a hunger free world are predominantly low yields (Rigby and Caceres, 2001). However, Badgley, et. al, (2007) claim that organic production can not only feed the world; but suggests that the agricultural land base could eventually be reduced if organic production methods were employed. Willer and Yussefi (2007) add that food security can be achieved with organic production by developing local organic markets, especially in the less industrialized world. As most of the organic production comes from the countries of Asia and Latin America (Parvathi and Waibel, 2013), the impact of organic farming on production becomes a relevant question for developing countries.

Nevertheless, it cannot be denied that green revolution has played a huge role in the agricultural history of many developing countries. This initiative led by Norman Borlaug spared many from starvation, especially with the introduction of high yielding varieties. It transformed a developing country like India, from being in a stage of food deficiency and facing an imminent threat of famine in 1961 into being not just self-sufficient; but also become a major exporter in crops like rice, wheat and sugarcane in the world today.

Though green revolution did help Indian agriculture to increase production by many folds, the indiscriminate use of chemicals has endangered the sustainability of agriculture in the long run. It has always been criticized for potential food safety and environmental impacts (Ruttan, 2004). In India, green revolution over a period resulted in loss of crop diversity and soil fertility, depletion of water resources and increase of pests and diseases. Can alternative practices, like organic agriculture, provide a solution to these remain to be explored?

Organic farming was officially recognized by the Indian government in 2000. It is still in its nascent stage and it is not yet possible to have confirmed estimates of the extent of organic production in India (Garibay and Jyoti, 2003). The Indian spices segment is an important part of the agricultural sector and its export value in 2011-12 was US$ 2307.76 million (SBI, 2012). The share of India in the international spices market is 25% and pepper contributes to 8% of Indian exports in value terms (Parthasarathy et. al, 2011). From being a leading exporter and producer of pepper in the world till 1999, India has started to import pepper to meet its domestic demand (Jeromi, 2007). India went through a pepper shortage in 2003-04, wherein productivity declined due to poor farm management, low yield, depletion of soil fertility and outbreak of pests and diseases coupled with increasing input costs (HEMA et. al, 2007 and GAFOOR et. al, 2007). This made many smallholder pepper growers in India to choose alternative agricultural technologies to improve soil fertility and increase production. Organic agriculture was one of the popular choices considered by farmers during this period. Though setting certification standards and labeling increases adoption of a cleaner technology (Waibel and Zilberman, 2007), adopting organic certification schemes are a demanding challenge to resource poor Indian smallholder farmers.

Hence, in this chapter, the focus is on whether adopting organic agriculture can help in increasing pepper production in India. First the factors that drive farmers to adopt organic certification are identified and then its subsequent impact on production is assessed. This is largely relevant as most of the debate centers around the impact of organic agriculture towards food security or on the role of its adoption in isolation. But it is imperative to study both adoption and its impact on production in a unified setting to better understand its implications.

Many of the previous studies on organic agriculture identify age, education, social characteristics and perception among others and use a logit or a probit model to study the factors of adoption (e.g. Burton et. al 1999 and Isin, et al, 2007). Analyses where the timing of adoption was a focus, duration analysis was used (e.g Kallas et. al. 2010). The impact studies after adoption mostly emphasize on farm income and vulnerability to poverty (e.g. Bacon et. al, 2005). Though many studies have looked at the difference in crop yields between organic and conventional systems (e.g. De Ponti, et. al, 2012), this chapter contributes to existing literature by studying whether organic agriculture can play a defining role in helping India increase its pepper production and thereby overcome the domestic supply shortage.

The impact of organic adoption on pepper production is examined using cross-section data from South India. The methodological approach also takes into account the unobserved heterogeneity present in such studies. A counterfactual analysis is also constructed to compare production under actual and counterfactual cases. Using farm-level data from 290 small holder farmers in Kerala state, the impact of organic pepper adoption on production is estimated using full information maximum likelihood (FIML) switching regression to address endogeneity and self-selection bias. Results show that organic farmers have a better yield but non-adopters will benefit the most if they implement organic agriculture.

This chapter is organized as follows. In the next section, methodology used to decipher adoption determinants and their production impacts are described along with sample selection and data collection procedure. Thereafter, the econometric results are discussed and the chapter concludes with some discussion and policy implications.

4.2 Methodology

Literature states that adoption models are generally based on the theory that farmers make decisions in order to maximize their expected profits or utility under uncertainty (Feder, 1980, Dorfman, 1996). The choice of certified organic agriculture is denoted as C_1 and C_0 otherwise. The expected utility is a function of C_1 and C_0. The decision to adopt (d) can be defined as

$$d = U(a^1, a^0, X, \varepsilon) \quad (1)$$

where, $a^1$and a^0 are the utility levels associated with and without adoption respectively. X refers to a set of household features and other relevant covariates, ε refers to the error term and U (.) refers to the maximum utility from the decision to adopt. Farmer will adopt if they get maximum utility from adoption given their household and other unobservable covariates.

The simplest method to model the impact of adoption on quantity produced per hectare is an ordinary least squares, where a dummy denotes certification (1 adopter and, 0 otherwise). But this can lead to biased results as it treats adoption as exogenous whereas it could possibly be endogenous.

To account for this endogeneity and self-selection bias, an endogenous switching regression using FIML estimation is applied. The modelling is based on Dutoit (2007) and Maddala and Nelson (1975). The dependent variable, log quantity produced per hectare is denoted as Y_{ci} for non-adopters (control group) and Y_{ti} for adopters (treatment group). The independent variables X_{ci} and X_{ti} are $1 \times k_c$ and $1 \times k_t$ vectors for the two groups respectively. β_c and β_t are $k_c \times 1$ and $k_t \times 1$ vectors of specific individual parameters and α is a $k \times 1$ parameter vector. We do not enforce $\beta c = \beta t$ as the production effects may be individual specific. Also let L_i be a latent variable determining which group applies and S_{li} be a $1 \times k$ vector of independent variables explaining the possibility of being in the treatment group. Let the error terms be u_{li}, v_{ci} and v_{ti}. Following this, an endogenous switching regression can be shown as the below set of equations

$$Y_{ci} = X_{ci}\beta_c + v_{ci}, \text{ if } L_i = 0 \quad (2)$$

$$Y_{ti} = X_{ti}\beta_t + v_{ti}, \text{ if } L_i = 1 \quad (3)$$

$$L_i = 1 (S_{li}\alpha + u_{li} > 0) \quad (4)$$

Equations (2) and (3) describe the variables of concern in each of the two groups, whereas (4) is a selection equation deciding which of the two groups apply. The error terms v_{ci}, v_{ti} and u_{li} are assumed to have a trivariate normal distribution with mean zero. An important implication of the error structure in this model is that because the error term, u_{li} of the selection equation (4) is correlated with the error terms of equations (2) and (3), the expected values of v_{ci} and v_{ti} conditional on the sample selection are non-zero, i.e.

$$E(Y_{ci} \mid X_{ci}, L_i = 0) = X_{ci}\beta_c + [-e_c \frac{\phi(Zi\alpha)}{1-\Phi(Zi\alpha)}] \quad (5)$$

$$E(Y_{ti} \mid X_{ti}, L_i = 1) = X_{ti}\beta_t + [e_t \frac{\phi(Zi\alpha)}{\Phi(Zi\alpha)}] \quad (6)$$

where, the term $\frac{\phi(Zi\alpha)}{1-\Phi(Zi\alpha)}$ is the inverse mills ratio for $L_i = 0$ (non-adopters) and $\frac{\phi(Zi\alpha)}{\Phi(Zi\alpha)}$ is the inverse mills ratio for $L_i = 1$ (adopters). $\phi(.)$ refers to the standard normal probability density function and $\Phi(.)$ refers to the standard normal cumulative density function. If the covariances of the error terms $\hat{e}c$ and $\hat{e}t$ are statistically significant, it indicates that the decision to adopt and the quantity produced per hectare are correlated. This signifies the presence of endogenous switching and rejects the null hypothesis that there is no sample selection bias.

For the FIML estimation to be robust, exclusion restrictions need to be used. Hence, in this study we use perception variables and distance to market as selection instruments based on a falsification test[4]. A variable is considered as a valid selection instrument if it affects the adoption decision but does not affect the quantity produced per hectare of non-adopters (Di Falco et. al, 2011).

Table 4.1: Treatment and Heterogeneity Effects

Sub-Samples	Decision		Treatment Effects
	To Adopt	Not to Adopt	
Farm households that adopted	***(a)*** $E(Yt_i \mid L_i=1)=X_{ti}\beta_t+e_t\lambda_{ti}$	***(c)*** $E(Y_{ci} \mid L_i=1)=X_{ti}\beta_c+e_c\lambda_{ti}$	TT
Farm households that did not adopted	***(d)*** $E(Yt_i \mid L_i=0)=X_{ci}\beta_t+e_t\lambda_{ci}$	***(b)*** $E(Y_{ci} \mid L_i=0)=X_{ci}\beta_c+e_c\lambda_{ci}$	TU
Heterogeneity effects	BH_t	BH_c	TH

Source: Adapted from Di Falco et. al. (2011)

This endogenous switching regression model can also be used to obtain counterfactual outcomes. The amount of quantity produced per hectare by adopters had they not adopted and the amount of quantity produced per hectare by non-adopters if they had adopted can be ascertained. Hence we will have four cases as presented in table 4.1. The inverse mills ratio for adopters and non-adopters are denoted as λ_{ci} and λ_{ti} in table 4.1 respectively.

[4] The falsification tests for the validity of selection instruments results are presented in Appendix A4.1

Cases (a) and (b) in table 4.1 refer to the observed log quantity produced per hectare for adopters and non-adopters respectively. Cases (c) and (d) refer to the counterfactual expected log quantity produced per hectare. As per Heckman et. al (2001), TT refers to the effect of treatment to adopt on the treated as the difference between cases (a) and (c). TU is the effect of treatment on the untreated and is represented as the difference between cases (d) and (b). Drawing from Carter and Milon (2005), BH_t denotes the base heterogeneity for the households that decided to adopt as the difference between cases (a) and (d) and BH_c refers to the households that did not adopt and is the difference between cases (c) and (b). Transitional heterogeneity (TH) is also estimated to understand the effect of organic adoption as the difference between TT and TU.

4.3 Data and study area

Kerala produces 80 - 90% of the total pepper production in India (SBI, 2008). Idukki is the largest pepper producing district in Kerala and hence, it is chosen as the survey area. In Idukki, around 86% of the population is involved in agricultural activities. The major sources of income are from pepper, cardamom, tea, rubber and coffee production (District-Administration, 2011). Idukki has 37.92% of the total pepper area of Kerala and the contribution of pepper to total agricultural income is around 20% (SBI, 2008 and ESD, 2011). In Idukki, the taluks of Udumbanchola and Peerumedu were non-randomly selected as they grow majority of the pepper in the district. It also needs to be noted that both these regions share similar climate conditions, rainfall and topography.

A cross-section data from 290 small holder pepper households was collected in 2012. The data pertains to previous production year 2011. This survey was focused on smallholders who own less than five hectares of farm land.

A list of smallholder conventional pepper farmers were obtained from the agricultural office of Idukki district. With regard to certified farmers, the details were collected from a local non-government organisation (NGO) promoting organic agriculture and certification. It was observed in the lists that all conventional farmers were from Udumbanchola and more than 50% of the organic farmers were from Peerumedu. Random sampling was then employed to these lists and 90 conventional and 200 certified organic households were selected.

A household survey questionnaire was used to draw information on household characteristics, agricultural activities, off-farm employment, asset endowments and credit access. A specific section was designed on the basis of a likert scale (1 to 5) to understand perception and attitudes towards organic agriculture. The description of the variables used in regression is presented in table 4.2 and the descriptive statistics of the variables are shown in table 4.3.

Table 4.2: Definition of variables used in regression

Variable name	Description
Dependent variables	
Organic Adoption	dummy = 1 if the farm household adopted organic farming
Quantity produced per ha (log)	log of quantity produced per hectare in kg
Explanatory Variables	
Household characteristics	
Age	age of the household head in years
Years if schooling	education of the household head in years
Farm experience	farm experience of the household head in years
Total household Size	total number of members of the farm household
Dependency ratio	The total household members below 15 and above 65 divided by the rest of the household members
Access to credit	dummy = 1 if household had access to credit
Access to off-farm income	dummy = 1 if household had access to off-farm income
Assets	
Production Asset	dummy = 1 if household has machinery
Livestock	dummy = 1 if household has livestock
Inputs	
labour use	family and hired labor use per hectare in days
fertilizer and Manure use	fertilizer and manure use per hectare in kg
Variable costs per ha (log)	log of total variable input expenses per hectare in INR It includes labor, fertilizer[5], manure, irrigation, pesticides and insecticides costs
Perception	
Risky	dummy = 1 if organic farming was perceived as risky
Soil Fertility	dummy = 1 if organic farming was perceived to improve soil fertility
Food Safety	dummy = 1 if organic farming was perceived to improve food safety
Distance to market (log)	log of the distance from farm to market in km

Source: Own compilation based on household survey 2011 and 2012

[5] Organic farmers used organic fertilizers, manures and insecticides whose costs are also included.

All the organic farmers in this study are certified as per the regulations set by International Federation of Organic Agriculture Movement (IFOAM). Both conventional and organic farmers, in the study region, produced pepper in combination with other crops like cardamom, coffee, coconut etc. Each farmer had their own different combination. This could create problems in comparing quantity produced per hectare between adopters and non-adopters.

Table 4.3: Descriptive statistics

Variable Name	Total Sample		Adopters		Non-Adopters	
	Mean	SD	Mean	SD	Mean	SD
Dependent variables						
Organic Adoption	0.690	0.463	1.000	0.000	0.000	0.000
Quantity produced per hectare	1021.555	2446.381	1191.921	2709.979	642.963	1674.134
Explanatory Variables						
Household head and farm household characteristics						
Age	52.541	11.230	53.260	11.122	50.944	11.365
Years of schooling	9.052	3.246	8.890	3.201	9.411	3.331
Farm experience	31.734	12.608	33.080	12.633	28.744	12.092
Total household Size	4.352	1.419	4.345	1.416	4.367	1.434
Dependency ratio	0.407	0.502	0.410	0.494	0.400	0.520
Access to credit	0.883	0.322	0.910	0.287	0.822	0.384
Access to off-farm income	0.372	0.484	0.380	0.487	0.356	0.481
Assets						
Production Asset	0.590	0.493	0.755	0.431	0.222	0.418
Livestock	0.628	0.484	0.635	0.483	0.611	0.490
Inputs						
labour use	247.760	742.386	259.919	876.576	220.741	265.522
fertiliser and Manure use	4292.115	12688.600	6125.756	14924.210	217.356	659.464
Variable costs per ha	48614.550	87771.750	64772.670	97755.180	12707.630	41934.610
Perception						
Risky	0.634	0.482	0.585	0.494	0.744	0.439
Soil Fertility	0.238	0.427	0.300	0.459	0.100	0.302
Food Safety	0.241	0.429	0.285	0.453	0.144	0.354
Distance to market	3.418	4.546	2.494	2709.979	5.472	7.460
Sample Size	290		200		90	

Source: author´s own calculation based on household survey 2012

Hence, to facilitate measurement and to specifically understand organic farming as a solution to increase pepper production, pepper which is the major crop produced by all farmers in the sample, is used to measure the impact of organic certification on production. The details like input used (labor, fertilizer and manure), land size and variable costs relate only to pepper in this chapter. This helps to ensure that apart from differences in agricultural practices, both adopters and non-adopters are exposed to the same climatic factors and cropping period. This is to confirm that any differences in quantity produced for pepper are only due to the agricultural practice followed and not due to any other intervention.

4.4 Results and Discussion

The estimates of the endogenous switching regression model are reported in table 4.4. Column (a) shows the OLS result, where organic adoption is represented as a dummy equal to 1, for adopters. Column (b) presents the coefficients of the selection equation and column (c) and (d) estimates the log quantity produced per hectare by adopters and non-adopters respectively.

The OLS (a) does not take the selection equation into account. The dummy variable of organic adoption (1 = adopters) though positive is not significant showing that adoption does not influence the log quantity produced per hectare. But as this is exogenously determined and does not take the selection equations into account, OLS results are biased. This is clearly demonstrated by the test of independence of equations that indicates that the errors of selection and production equations are not independent reaffirming that the estimates of OLS are inconsistent.

The endogenous switching regression model is presented in column (b), (c) and (d). The correlation term (ρ_j) in table 3.4 is positive and significantly different from zero for non-adopters (d) demonstrating the presence of selectivity bias in their sample. The differences in the coefficients of the outcome equations between adopters and non-adopters in column (c) and (d) indicate the presence of heterogeneity.

Age, farm experience household size, dependency ratio and assets are inferred to be some of the significant determinants of organic adoption as also found in previous literature (e.g. Musara, et al., 2012; López and Requena, 2005; Läpple, 2010). Contrary to many findings

(e.g Ajewole, 2010), this study finds that education though significant is negatively related to adoption. This could be because farmers of this region had tremendous support from the local NGO. The awareness programs conducted by the NGO helped these famers to fathom such alternative agricultural farming systems.

Table 4.4: OLS and endogenous switching regression estimates

	(a)	(b)	(c)	(d)
		Endogenous Switching regression		
Model	OLS		Adopters	Non-adopters
Dependent variables	Quantity produced per hectare (Log)	Adoption (1/0)	Quantity produced per hectare (Log)	Quantity produced per hectare (Log)
Explanatory Variables				
Organic Adoption	0.640			
	(0.366)			
Household characteristics				
Age	0.004	-0.043***	-0.007***	0.024***
	(0.007)	(0.015)	(0.000)	(0.001)
Years of schooling	0.013	-0.105**	0.015***	0.021**
	(0.004)	(0.042)	(0.002)	(0.009)
Farm experience	-0.002	0.037***	0.006***	-0.013***
	(0.006)	(0.006)	(0.001)	(0.005)
Total household Size	0.069	-0.069***	0.091***	0.010
	(0.034)	(0.015)	(0.014)	(0.028)
Dependency ratio	0.170	0.327***	0.126**	0.279***
	(0.085)	(0.045)	(0.064)	(0.045)
Access to credit	0.162	0.039	0.202***	0.292***
	(0.066)	(0.125)	(0.029)	(0.048)
Access to off-farm income	-0.366*	0.229	-0.604***	0.085
	(0.052)	(0.375)	(0.191)	(0.236)
Assets				
Livestock	0.054**	-0.268**	0.097	-0.073
	(0.002)	(0.124)	(0.085)	(0.099)
Production Asset	0.596	1.751**	0.416	1.255***
	(0.140)	(0.678)	(0.351)	(0.325)

Inputs				
labour use	0.001		0.0003**	0.0003***
	(0.000)		(0.000)	(0.000)
fertiliser and Manure use	0.000		0.000	0.0001***
	(0.000)		(0.000)	(0.000)
Variable costs per ha (log)	-0.009	0.041	-0.017***	0.015
	(0.002)	(0.028)	(0.006)	(0.017)
Perception				
Risky		-0.484***		
		(0.157)		
Soil Fertility		0.622***		
		(0.033)		
Food Safety		0.152**		
		(0.064)		
Distance to market (log)		-0.582***		
		(0.002)		
Constant	4.659**	2.417***	5.741***	4.384***
	(0.130)	(0.369)	(0.508)	(0.234)
σ_i			-0.197***	0.295***
			(0.008)	(0.003)
ρ_j			-0.174	0.934***
			(0.143)	(0.192)
Wald Test of indep. Eq			Prob> chi2 = 0.000***	
Observations	290		290	

Note: Estimation by full information maximum likelihood.
Robust standard errors clustered at the taluk level in parenthesis.
σ_i refers to the square root of the variance of the error terms in the outcome equations (2) & (3).
ρ_j refers to the correlation coefficient between the error term in the selection equation (4) and the error terms of the two outcome equations (2) and (3) respectively.
***Significant at 1% level, **Significant at 5% level and *Significant at 10% level.
Source: author´s own calculation based on household survey 2012

It is interesting to note that the age of the household head negatively affects adopters but non-adopters positively. This indicates that younger farmers are more prone towards organic adoption and thereby produce more log quantity per hectare. Most of the household characteristics and credit access significantly affects log quantity produced per hectare and is consistent with economic theory. Access to off-farm income negatively affects yield of adopters.

This may be due to the fact that adopters who do not have access to off-farm income may be more efficient producers (Diiro, 2013).

In terms of assets, owning production assets significantly influences the log yield of non-adopters. Inputs like labor, fertilizer and manure use increase log quantity produced per hectare positively and significantly. Log input expenses per hectare is negatively significant at 1% for adopters indicating that lower input costs makes production more efficient.

The log of expected quantity produced per hectare under actual and counterfactual cases are presented in table 4.5. Following table 4.1, table 4.5 reports the log quantity produced per hectare observed in the sample. The log expected quantity produced by adopters is 6.44 kg while it is 5.58 kg for non-adopters. But based on this and table 4.3, it cannot be concluded that adopters produced 85% more per hectare. Such an inference can misrepresent the analysis.

Table 4.5: Log of expected quantity produced per hectare: Treatment and Heterogeneity Effects

Sub-Samples	Decision		Treatment Effects
	To Adopt	Not to Adopt	
Farm households that adopted	***(a)*** 6.435 (0.042)	***(c)*** 6.383 (0.038)	TT = 0.052 (0.057)
Farm households that did not adopted	***(d)*** 7.882 (0.132)	***(b)*** 5.583 (0.048)	TU = 2.299*** (0.140)
Heterogeneity effects	BH_t = -1.447*** (0.115)	BH_c = 0.800*** (0.058)	TH = -2.246*** (0.129)

Note: Standard errors in parenthesis.
***Significant at 1% level
Source: author´s own calculation based on household survey 2012

The cases (c) and (d), in table 4.5, reports the counterfactual scenarios. The log expected quantity of adopters had they not adopted would have been 6.38 kg, around 31 kg less. In the case of non-adopters, they would have produced ten times more had they adopted. Hence, the results indicate that organic adoption significantly increases log quantity produced per hectare. However, the transitional heterogeneity is negative implying that the effect is significantly smaller for adopters than for non-adopters.

The base heterogeneity (BH_c) suggests that adopters would have still produced twice more quantity than non-adopters even if they had not adopted, showing that there are some substantial sources of heterogeneity that make adopters better producers than non-adopters. Nonetheless, as indicated by BH_t, non-adopters can produce more through adoption of organic farming.

With reference to the current debate on whether organic agriculture will lead to food security, the findings in this paper point that conversion to organic agriculture does help in increasing production per hectare. This is contrary to the findings of Maeder, et. al. (2002) in which yields were 20% lower for organic crops in a study conducted in Central Europe. But organic agriculture also requires adequate knowledge on farm management, technical support and quality control (IFAD, 2003). In this study all such support, along with access to organic fertilizer and manure was available to the organic smallholder farmers from the local NGO. This may have contributed to higher production per hectare in the study area.

It is also found in the counterfactual results of this study that non-adopters would actually do better than adopters, in terms of log pepper quantity produced per hectare, if they practice organic farming. This is also the case with studies made in developed countries like Finland where farmers who have lower yields generally adopt organic technology and perform well (e.g. Lansink, et. al, 2002, Pietola and Lansink, 2001).

Resource conserving agriculture does help in increasing yield (Pretty et. al, 2006). Organic farming is also considered to be a resource conserving farming practice, that can lead to sustainable development as found by Devi et. al (2007) in Ethiopia. It also has the potential to improve the efficiency of environmental indicators, as pointed out by Pacini, et.al. (2003) and also contributes to sustainable rural development as argued by Pugliese (2001).

However, it should be noted that in this study the impact of organic methods of cultivation on log quantity produced per hectare on pepper, a cash crop, is considered. It could also be that certain crops are more suitable for organic cultivation than others (Sinkkonen, 2002). Therefore, crop specific studies may give different results. But farmers should have adequate knowledge of organic farming and accessibility to necessary training and support to make organic farming a success for any crop.

4.5 Conclusions

The purpose of this study was to understand if organic agriculture can help to increase pepper production in India. To address this, the objective of this chapter was to capture the determinants of organic adoption and its subsequent impact on production quantity among the smallholder farmers in India. To overcome endogeneity problem arising from sample selection, an endogenous switching regression is used that also accounts for unobservable factors that influence adoption and its impact on production. The study utilizes cross-section household survey data collected in 2012 from 290 households in India.

The adopters in this study have analytically different characteristics than the non-adopters, which cannot be considered by a normal OLS; are captured effectively by the endogenous switching model. The inference from this chapter is that organic adoption does increase log quantity produced per hectare for pepper. Adopters have some unobservable features (e.g. farm management skill) that make them better producers, even under the counterfactual setting. An interesting finding of this study is that the impact of adoption on production is smaller for households that adopted organic agriculture. This implies that though both groups of smallholder households would benefit from implementing organic farming, the non-adopters would gain the most. Therefore, adoption is more important for those households that have less competence to produce. It helps such households to close the gap with more productive smallholder pepper households.

Hence, this chapter submits that organic agriculture does have the potential to help India increase its pepper production. Therefore, this prospect needs to be explored by India through evolving policies that encourage organic pepper growers. Systems and structures needs to be established that support organic farmers in terms of access to information, training, technical and other support. The Indian domestic organic market also needs to be developed to promote organic agriculture in the long run.

These findings are also relevant for designing effective policies to promote certification and organic agriculture adoption in other developing countries. Establishing third party non-government associations or effectively functioning agricultural extension services can help in encouraging organic agriculture and certification among the low income and poverty vulnerable smallholder households. Developing policies can be crucial in promoting adoption

of such sustainable practices that help in increasing yield and total production. Moreover, developing organic agriculture as a strategy for the less productive farmers can play a critical role towards contributing towards rural development in the less developed world.

CHAPTER 5

ADOPTION AND IMPACT OF ORGANIC AND FAIR TRADE CERTIFICATION OF PEPPER IN INDIA[6]

This chapter discusses the third objective of the thesis and examines the factors that drive adoption of organic and both organic and fair trade certification. It also studies the differential gain of adoption in terms of total household income of the farm household.

5.1 Introduction

The Indian spices sector is an important part of the agricultural sector and its export value was US$ 2037.76 million in 2011-2012 (SBI, 2012). Currently in India 60, out of the 109 spices, recognized by the International Organization for Standardization (ISO) are grown. India's share in the international market for spices is 25% and pepper amounts to 8% of Indian exports in value terms (Parthasarathy et. al, 2011).

While until 1999 India was the leading pepper producer in the world with 76000 metric tons (MT) by 2010 its production had declined to 51000 MT (FAO, 2010). From being a leading exporter of pepper in the world, India is now importing pepper (Jeromi, 2007). Productivity of pepper is low as indicated by the fact that though more than 50% of the world´s area of pepper is in India, it only contributes 25% to global production. For example, while the average yields of pepper in India is 267 kg/ha, it is around 2000 kg/ha in Vietnam, which is the leading producer today. The decline in productivity in India is due to poor farm management, depletion of soil fertility, natural calamity and outbreak of diseases and pests coupled with increasing input costs (Hema et. al, 2007 and Gafoor et. al, 2007).

The production and profitability of pepper are highly influenced by its international price. This makes the revenues from black pepper highly volatile (Hema et.al, 2007). The domestic price in India is influenced by the instabilities in international prices. This has made pepper a

[6] This chapter was presented as a paper in Tropentag 2013held at Univsersität Hohenheim and is submitted to the Quarterly Journal of International Agriculture.

risky crop. As a consequence, many smallholder pepper farmers in India have shifted to organic farming practices and have adopted fair trade marketing.

While fair trade marketing practices have been introduced in India at least three decades ago, organic farming is more recent and was officially recognized by Indian Government in 2000 only. The adoption of organic farming practices and the participation in fair trade certification regimes provides access to global markets for the smallholder farmers (ADB, 2012). For the pepper industry in India, organic pepper marketed under fair trade regimes, provides an opportunity to diversify agricultural export markets. This can contribute to increased and more stable income from agriculture. While improving production standards through certification and labeling can generate economic and environmental benefits (Waibel and Zilberman, 2007), conversion to organic farming and entering fair trade marketing arrangements is not without costs to farmers. To meet required production and product quality standards can be demanding, especially for resource poor, less educated farmers. Nevertheless, as hypothesized by Parvathi and Waibel (2013) adopting both innovations can be mutually reinforcing, leading to higher benefits when adopted together. Hence, this paper examines the factors that influence the adoption and impact of such alternative farming systems

While there are many papers that have analyzed adoption and impact of organic and fair trade certification separately, so far there is no study that has scrutinized the combined effects of both certification schemes. Hence this research examines to what extent black pepper produced organically and marketed under fair trade managements, can improve income of smallholder farmers in India. Moreover, most of the adoption studies do not explicitly examine the counterfactual analysis and the differential gain of adoption. Therefore, this study analyzes the causal impact of adopting organic and both organic and fair trade certification on total household income. In this context, the objective of the chapter is to answer the following questions:

1. What are the drivers that influence the adoption of organic and fair trade certification systems by smallholder pepper farmers?
2. What is the impact of organic and fair trade certified pepper on the total household income?

As most adoption studies are based on cross-section data, this chapter will extend the literature on adoption methodologically by exploring the added value of panel analysis in identifying adoption determinants in comparison to cross section data. The advantage of using a panel multinomial logit with random effects is that it helps to account for unobserved heterogeneity in adoption decision. For measuring impact, propensity score matching with multiple treatment effects is used. Results show that organic farming does have a positive impact on income but fair trade certification does not seem to add additional benefits

The remainder of this chapter is organized as follows. In the next section, the conceptual framework and methodology is presented followed by a description of the data collection procedure and descriptive statistics in section three. The results of the econometric analysis are discussed in section four. Section five concludes the chapter with some policy implications.

5.2 Conceptual framework and methodology

5.2.1 Panel model for adoption studies

Though economists regarded technology adoption as a dynamic process, most of the adoption studies use cross-section data. However, studies that use cross-section data and compare adopters to non-adopters cannot be used to analyze the characteristics of farmers at the time of adoption. This is because variables like farm size may be endogenous. For example, if in a cross-section adoption study farm size is found to be significant factor influencing adoption, it does not necessarily imply that farmers with larger landholdings are more likely to adopt, because larger landholdings might be a consequence of earlier adoption decisions. Also, static adoption models based on cross-section data assuming values of time varying variables as constant (Besley and Case, 1993). Using current household, farm and individual characteristics as explanatory variables to describe adoption of an agricultural technology using cross-section data can lead to a misinterpretation of results. While cross-section adoption regressions may provide evidence on correlation it does not necessarily proof causality. Moreover, it could also be the case that unobserved variables (e.g. farm management skills) influence farm size and certification status leading to spurious correlations. Hence, adoption studies based on cross-section data can result in biased coefficients with inconsistent estimates of the adoption drivers.

To overcome the problem of endogeneity due to unobserved heterogeneity, past and recent research (Besley and Case, 1993 and Barham et.al, 2004) points out the advantage of using panel data for adoption studies. The advantage of a panel model is that it can account for spurious causality in adoption decisions and also establish direction of causality in adoption analysis.

Though a perfect experimental design would be ideal, i.e. to follow adopters and non-adopters of a technology before and after introduction, a second best solution is to have panel data after adoption. Panel data allow for controlling heterogeneity across households and thereby accounting for endogenous regressors. Hence, the robustness of adoption models can be improved using panel data, even if no dis-adoption or late adoption is observed in the sample and the variability is only captured by the explanatory variables. The classic adoption model of Rogers (1995) assumes that adoption follows an *S* shaped diffusion path in which the adoption dynamics depends on the differences across farmer categories. We explore this facet by applying a panel adoption analysis and compare it with a cross section analysis applied to two consecutive years. Hence, on the basis of this foundation, we draw our first hypothesis that (a) panel model is more precise to identify organic and both organic and fair trade adoption determinants.

5.2.2 Adoption Decision

Literature has numerous approaches to model farm technology adoption behavior of farmers and identify the key factors that facilitate such a decision (e.g. Besley and Case, 1993). From an economic perspective final adoption of a new agricultural innovation is defined at the farm level as "the degree of use of a new technology in long-run equilibrium when the farmer has full information about the new technology and its potential" (Feder et.al, 1985, p. 256). Adoption models are generally based on the theory that farmers make decisions in order to maximize their expected profits or utility under uncertainty (Feder, 1980). Farmers choose an agricultural technology that maximizes their expected utility of profits (Dorfman, 1996).

In this chapter, the farmer is faced with two agricultural innovations, organic agriculture (A_1) and both organic and fair trade certified farming (A_2). Farmers may also choose to not adopt either innovation and remain conventional farmers. This is represented as A_0. The farmer's decision to adopt a particular technology can be defined as:

$$ADOPT = U(q^2, q^1, q^0, X, \varepsilon) \quad (1)$$

where, q^2, q^1 and q^0 are the levels of utility associated with and without adoption of the technological advancement, X represents a vector of farm household characteristics, socio-economic features and other relevant explanatory variables and ε represents unobserved factors. U (.) is the maximum utility associated with adoption. Therefore, individuals will adopt an innovation only if:

$$V(q^{(i,j)}, X) \geq V(q^0, X); \varepsilon \text{ , where } i = 1 \text{ and } j = 2 \quad (2)$$

where, $V(q^2, X, \varepsilon_2)$, $V(q^1, X, \varepsilon_1)$ and $V(q^0, X, \varepsilon_0)$ are indirect utility functions with each technology adoption and no adoption respectively and ε_2, ε_1 and ε_0 are assumed to be independent and identically distributed with zero mean.

Based on this rationale, the second hypothesis is constructed that (b) adoption has a significant and positive impact on income

As three groups of farmers are compared namely; conventional, organic and both organic and fair trade, a multinomial analysis is used. First a cross-section multinomial logit is employed to each cross-section year of the panel. This is to show that cross-section analysis may not lead to robust interpretations due to unreliability and inconsistency. Second, the cross-section multinomial logit is extended to panel data using generalized linear latent and mixed models (gllamm). Following Rabe-Hesketh and Skrondal (2004), a multinomial logit random intercept model is defined by identifying a linear predictor, L_i^n, n = 1,…,N so that the probability of farm household *i* choosing alternative *x* is given by:

$$Pr(x_i) = \frac{\exp(L_i^x)}{\sum_{n=1}^{N} \exp(L_i^n)} \quad (3)$$

The alternative with the highest utility is selected assuming that there is a latent response of the unobserved utility V_i^n connected with each alternative and is given as:

$$V_i^n = L_i^n + \varepsilon_i^n \quad (4)$$

An alternative *x* is selected if:

$V_i^x > V_i^y$ for all x $\neq$ y (5)

For each farm household specific covariates, a different coefficient vector y^n is estimated for each alternative except the base category.

In a cross-section multinomial logit the errors are assumed to follow an independent logistic distribution that gives rise to the independence of irrelevant alternatives (IIA) property which is seen as a limitation. To overcome this limitation the gllamm model allows for the correlation between random components by introducing shared random effects, u as:

$L_0 = X_0 + u_0 + \varepsilon_0$ (6)

$L_1 = X_1 + u_1 + \varepsilon_1$ (7)

$L_2 = X_2 + u_2 + \varepsilon_2$ (8)

The latent variables are assumed to be bivariate normal and are specified as $\delta 1 = (u_1 - u_0)$ and $\delta 2 = (u_2 - u_0)$. The latent variables reflect the propensity to favor one alternative over the other when the effect of the explanatory variables has been considered. The linear predictor comprises of the applicable independent variables X_{ij} as well as two latent variables, δ_j^n based on the random effects:

$$L_{ij}^n = \beta_0^n + \beta_1^n X_{ij} + \delta_j^n \quad (9)$$

The correlations between random components capture unobserved heterogeneity at the panel level and hence lead to unbiased parameter estimates of adoption determinants. Making the first alternative, conventional farming as the reference category; the two latent variables, δ_j^1 and δ_j^2 are for the other two categories, namely organic certified and both organic and fair trade certified farming respectively. Therefore, MNL gllamm can be defined with the inclusion of random effects as:

$$\Pr(choice, x = 1) = \int \delta 1 \int \delta 2 \frac{exp\,(\beta 1 X + \delta 1)}{1 + \exp(\beta 1 X + \delta 1) + \exp(\beta 2 X + \delta 2)}\, d\delta 1 \delta 2 \quad (10)$$

Integration is used as the individual values of the latent variable are not known. We only know that they are distributed bivariate normal. Adaptive quadrature and a modified Newton-Raphson procedure as implemented in Rabe-Hesketh and Skrondal (2002) are used for the

estimation of multinomial logit using gllamm. In this algorithm, the probabilities associated with the possible values of the latent variables are computed. These are then weighted by their likelihood of occurrence given the distributional assumptions for the latent variables.

To sum up, there are specific advantages in using a panel multinomial logit with random effects. First it allows to capture unobserved heterogeneity at the individual level by introducing alternative specify random effects (δ_j^1 and δ_j^2). This helps to account for heterogeneity in adoption decisions as a farmer´s decision in part to choose a particular certification strategy may be related to unobserved farm and individual characteristics. Second, it effectively captures individual choices that may not likely be independent. This is made possible by capturing repeated observations for the same household sharing the same unobserved random effects. Hence, panel multinomial logit analysis using gllamm deciphers adoption determinates accounting for unobserved heterogeneity.

5.2.3 Differential gain of adoption

The impact evaluation approach is used to measure the differential gain of adoption. Impact evaluation includes ex ante and ex post methods. In this chapter, an ex post impact evaluation is applied, wherein data is gathered after technology adoption, to measure the actual benefit accrued to the farmers in terms of income from organic and fair trade adoption. Impact assessment requires identifying a valid counterfactual. In an ex post analysis, the outcome of adopters cannot be observed, if they did not adopt. Hence there is a potential self-selection bias. To overcome this problem a counterfactual group has to be generated. There are several methods to correct such a self-selection bias. These include propensity score matching (PSM) (Rosenbaum and Rubin, 1983; Pearl, 2009), instrumental variable models (Heckman, 1997; Imbens and Angrist, 1994), Heckman selection model (Heckman, 1979; Lee, 2001) and endogenous switching regression models (Lokshin and Sajaia, 2004). In this study, data was purposively collected to have adequate representation of the three farmer groups, namely conventional, organic and both organic and fair trade certified smallholder farmers. This could inherently lead to sample selection bias induced by non-random program enrollment. But PSM helps to generate valid counterfactuals from a non-random sample (Mezzatesta et.al 2013). Hence, PSM is used to select reliable counterfactuals from a large pool of conventional farmers in an area with similar conditions.

PSM is generally used for bipartite matching, where we have one control and one treatment group. Since, in this chapter, there are three categories of smallholder pepper households, a propensity score matching with multiple treatment groups is employed following Lecher (2002). Here the propensity score is separately modeled for each of the three groups as $\frac{n\,(n-1)}{2}$. Hence, there are 3 pairs of control and treatment groups as depicted in table 5.1.

A binary logit model is used to estimate the propensity scores of the PSM model with multiple treatment effects. Nearest neighbor one-to-one matching and the kernel matching methods are employed to ascertain the Average Treatment Effect on the Treated (ATT). However, the limitation of this method is that we can only measure welfare based on observable characteristics of our sampled households (Nannicini, 2007). Hence, if there are unobserved variables that affect the outcomes, a hidden bias might arise. To check the sensitivity of the estimated ATT to hidden bias, a bounds test suggested by Rosenbaum (2002) is used. This helps to check if the impact results may change with respect to unobserved covariates. The sensitivity analysis estimates the upper and lower bounds to test the null hypothesis for different assumed values of unobserved variables.

Table 5.1: PSM with multiple treatment groups

Category	Control group	Treatment group
1	Conventional	Organic certified
2	Conventional	Both organic and fair trade certified
3	Organic certified	Both organic and fair trade certified

Source: Own compilation

5.2.4 Choice of explanatory variables

In their seminal paper, Feder et.al (1985) propose a wide range of explanatory variables like household characteristics, socioeconomic and physical factors. These same variables are also used in organic adoption studies both in developed and developing countries (e.g. Burton et. al, 1999, Burton et. al 2003, Genius, et. al, 2006, Bolwig et. al, 2009). The household characteristics are represented by including age, education level and farm experience of the household head. Availability of family labor, farm size and access to irrigation are included in

farm characteristics. Today agricultural extension agencies play a significant role in information dissipation. Thus, support received from extension agencies is also included as one of the independent variables. Farmers may be more motivated to adopt advancement of new products or technologies if market access is easy. Hence, distance to market is included as a variable. In terms of income, farmers having additional sources of income, apart from agriculture, may be better equipped to diversify the risk of adoption. To capture this, access to non-farm income is included. An easy credit access is useful to invest in agricultural advancements like organic and fair trade certified agriculture. This is captured in terms of the variable, access to credit. The wealth effects are represented through owning livestock assets. In adoption literature perception towards new technologies is seen as an important factor that influences adoption (Adesina and Zinnah, 1993; Rogers, 1995; Wossink et al., 1997; Amare et al., 2012). A positive perception influences and motivates a farmer towards adoption. Therefore, the respondents' perception towards organic and fair trade certified farming is used as an explanatory variable.

5.3 Data and Descriptive Statistics

Pepper in India is primarily cultivated in the Malabar Coast, state of Kerala. This state accounts for nearly 97% of the total black pepper production in India (Hema, et. al, 2007). It is the major source of income and employment for the rural households in Kerala, wherein two million farm households are involved in pepper cultivation. Idukki is the largest pepper producing district in Kerala and therefore, it is chosen as our study area.

Idukki is situated in the top Western Ghats surrounded by mountains. Around 86% of the population in Idukki is involved in agricultural activities. The major sources of income are from pepper, cardamom, tea, rubber and coffee production (District Administration, 2011). Idukki has 37.92% of the total pepper area of Kerala and the contribution of pepper to total agricultural income is around 20% (SBI, 2008 and ESD, 2011).

In Idukki, the taluks[7] of Udumbanchola and Peerumedu were non-randomly selected as they grow majority of pepper in the district. Udumbanchola is the largest taluk in Idukki and has 23 villages in total. Peerumedu has 10 villages. Both these taluks share the same topography

[7] Taluk is an administrative division of the district. It is like an entity of the local government and has certain fiscal and administrative powers over the villages and municipalities coming under its jurisdiction

and are covered by rugged mountains and forests. They experience moderate rainfall and minimum seasonal variation.

A list of smallholder conventional pepper farmers were obtained from the agricultural office of Idukki district for these two taluks. With regard to certified farmers, the details were collected from a local Non-Government Organisation (NGO), called Peermade Development Society (PDS). It is the largest NGO operating in the district and is a promoter of organic cultivation and fair trade marketing practices. Details of smallholder farmers who are organic certified and both organic and fair trade certified were obtained from PDS. Hence, In terms of management regimes, there are three groups of smallholder pepper farmers namely: (a) conventional (b) organic and (c) both organic and fair trade certified. There is no "only fair trade" certified category. This is because in Idukki, only fair trade certified pepper farmers are very large scale tea planters who grow pepper as a mixed crop. Their minimum landholding is 10 hectares. However this study was focussed on smallholders, i.e. farmers with less than five hectares of farm land.

It was seen from both the lists that all the conventional farmers were concentrated in Udumbanchola. But the organic and both organic and fair trade certified farmers were spread out in both these taluks though more than 50% were from Peerumedu. There was no village in these taluks that represented all the three categories of farmers in the lists provided. This may be due to the fact that as the NGO is situated in Peerumedu; it is more active in that region and is only in the process of expanding in other areas of Idukki.

From these obtained lists, a sample of 100 farmers was randomly chosen for each category. Hence, a total of 300 farmers were chosen. These 300 farmers come from 9 villages in Udumbanchola and 5 villages in Peerumedu. Thereby, a total of 300 farmers were surveyed in 2011 from 14 villages in Idukki. In 2012, due to attrition of 3 conventional famers, data was collected from a total of 297 farmers. Also, there was no dis-adoption or late-adoption observed in the sample in 2012 and all farmers remained in the same category as in 2011 survey.

In such a sampling scenario, applying panel model is better to control for unobserved heterogeneity in the adoption regression. Moreover, employing PSM for impact analysis is credible as it helps to select a valid counterfactual from an area where organic and organic fair

trade is still not widely introduced. Furthermore as both the taluks in which these 14 villages are located share similar topographical and climatic conditions; they can provide an effective counterfactual for the PSM analysis.

In the surveys, farmers were asked about prior production year, i.e. 2010 and 2011 respectively. Panel data was collected for two consecutive years in order to measure changes from production decisions that go beyond one year. This also helped to account for endogenous explanatory variables.

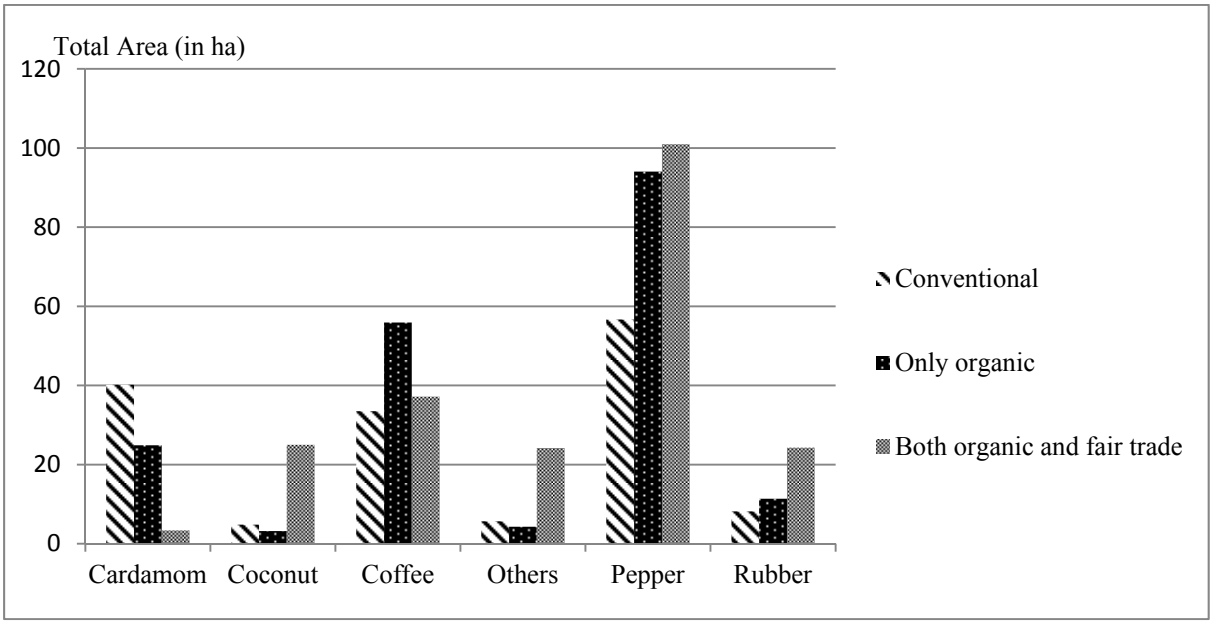


Figure 5.1: Major crops grown as per planted area in the surveyed households
Source: Own calculation based on household survey 2011 and 2012

A household survey questionnaire was used to elicit information about household characteristics, agricultural activities, off-farm employment, asset endowments, credit access and consumption expenditure. A specific section was designed on the basis of a likert scale (1 to 5) to understand their perception and attitudes towards organic and fair trade certified agriculture.

As pepper is a vine, in the survey area pepper vines were planted in combination with other crops like areca nut, coconut, silver oak (timber) trees or were tied to teak poles. In the sampled households, for both the group of certified farmers, the total agricultural land is certified organic. There is no partial organic land adoption in the sample. Figure 5.1 shows

some of the major crops grown by the surveyed households. Pepper is the major crop grown by both conventional and certified households. Cardamom is the second major crop grown by conventional households, followed by coffee. In case of organic certified and both organic and fair trade certified farms, coffee is the second major crop. Some of the other crops cultivated in the surveyed households include coconut, rubber, turmeric, tea, nutmeg, areca nut, ginger, cloves and vanilla.

The NGO provided the necessary training and technical assistance during conversion phase from conventional to organic production. It also advances the inspection and certification costs for the certification process carried out by international certification agencies for organic farming and fair trade. The condition for the payment of certifications charges is that all certified products (except coconut and rubber) should only be sold to the NGO. To recover the certification costs the NGO reduces the market price for both the categories of certified products.

Table 5.2: Farm household level economic benefit from pepper

Input-Output Parameters	Conventional (Obs. = 197)	Organic (Obs. = 200)	Both organic and fair trade (Obs. = 200)
Area (in ha)	0.30	0.47	0.49
Yield (kg/ha)	574	1240	819
Gross income (in '000 INR/ha)	201	280	185
Variable costs (in '000 INR/ha)	47	34	93
Net income (in '000 INR/ha)	154	246	92

Note: The above are the mean values
Source: Own calculation based on household survey 2011 and 2012

Selected input-output parameters of pepper are shown in table 5.2. The organic certified famers perform best among the three groups. They achieve the highest average yield and the lowest average variable costs per hectare. The conventional famers have the lowest yield per hectare. Their average gross income per hectare is less and average variable costs more than the organic certified farmers. Farmers growing both organic and fair trade certified pepper have the highest farm area. However their net average income from pepper is the lowest. Fair trade certification was introduced by the NGO, only around mid-2000s, to its already existing

organic certified households. Some households decided to adopt and these households began to sell as organic and fair trade certified producers only in 2009. As the survey data is from 2010 and 2011, it captures only early-adopters of organic and fair trade certified pepper. Hence, the productivity and economic benefits of this group of households may not yet fully reflect the full potential. However, in the sample organic adoption and diffusion is seen as a continuous process. Figure 5.2 depicts the organic pepper adoption of organic and both organic and fair trade certified farmers. The years of organic adoption of pepper ranges from as early as 1997 to 2010 in the sample.

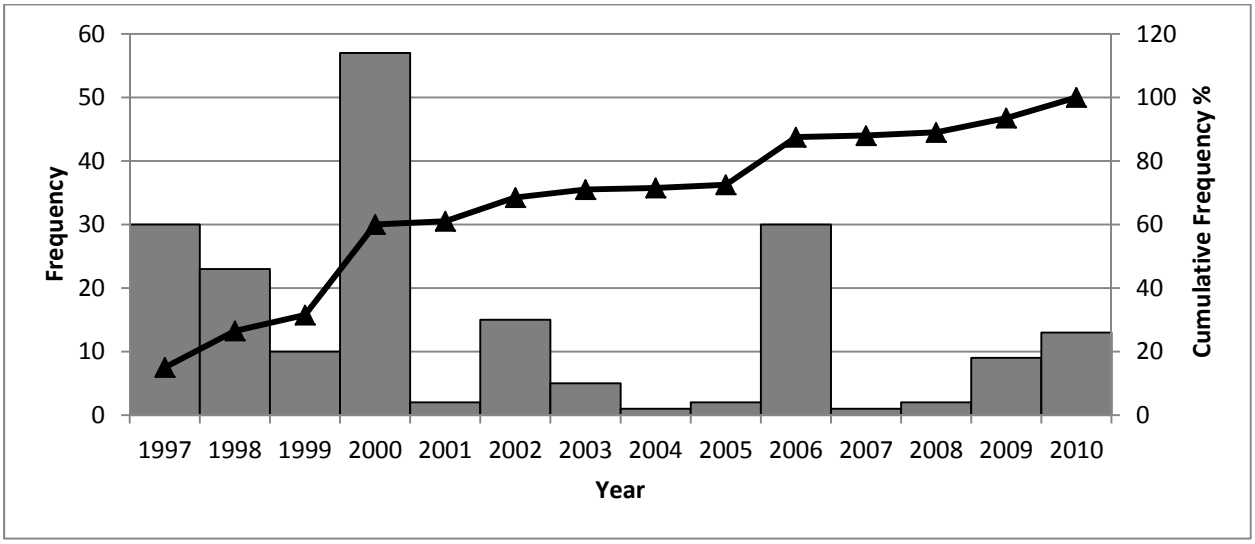


Figure 5.2: Organic adoption over the years
Source: Own calculation based on household survey 2011

For a better understanding of the factors that drive adoption, respondents, i.e. mainly the head of household were asked what their key purpose of adopting any of the two certification systems were. It is found that 22% of the farmers felt deteriorating soil quality and health concerns (21%) were their chief reason to venture into organic methods of production. Other factors like higher output prices (18%), low input costs (15%) and environmental concerns (14%) contributed to taking a decision towards converting to organic. The possibility of an assurance of a minimum price (65%) was one of the chief drivers that made organic certified farmers also enter fair trade marketing practices.

The independent variables used in the multinomial regression are described in appendix table A5.1. The household specific characteristics like age, education and farm experience are

measured for the household head assuming him/her to be the decision making authority of the smallholder household. The perception variable was measured using a five point likert scale rating respondent's attitude towards a total of six factors that included soil quality, economic benefit, risks, health, environment and government support. The ratings 1 and 2 were considered as one and 3 and above as zero for each of the factors. Then total score was calculated and all households equal to or above the mean were given the value of one and zero otherwise. This is a dummy variable included in the models where one is considered a positive response.

Table 5.3: Descriptive Statistics of the variables under each category

Variable	**Conventional (n = 197)**		**Organic (n = 200)**		**Organic & fair trade (n = 200)**	
	Mean	**SD**	**Mean**	**SD**	**Mean**	**SD**
Age (in years)	50.85	11.65	51.97	10.86	53.93	11.5
Years of schooling	9.37	3.21	9.79	3.05	7.94	3.09
Farm experience (in years)	29.17	12.27	33.06	11.7	33.56	13.45
Household size	4.46	1.36	4.4	1.26	4.26	1.51
Dependency ratio	0.4	0.51	0.49	0.51	0.35	0.5
Total Land size	0.76	0.60	0.97	0.58	1.08	0.76
Irrigation access (yes = 1)	0.37	0.48	0.04	0.20	0.19	0.39
Extension support (yes = 1)	0.17	0.37	0.06	0.24	0.1	0.3
Market distance (in km)	5.65	18.38	2.91	3.3	2.29	1.56
Off-farm access (yes = 1)	0.41	0.49	0.36	0.48	0.43	0.5
Credit access (yes = 1)	0.82	0.39	0.91	0.29	0.98	0.14
Have livestock (yes = 1)	0.57	0.50	0.52	0.50	0.61	0.49
Positive perception towards organic fair trade	0.19	0.39	0.30	0.46	0.58	0.5
Income impact dependent variable						
Total income per capita (in INR)	17741	25567	40542	91019	27461	44513

Note: SD refers to Standard Deviation.
Source: Own calculation based on household survey 2011 and 2012

Table 5.3 presents the descriptive statistics category wise. The household characteristics in terms of age, education and experience of the household head are almost similar for the three groups. There is also not much difference in household size and dependency ratio. The organic and fair trade certified farmers have a bigger land size than others and enjoy a shorter

distance to market. Conventional farmers have higher access to irrigation and extension support.

Table 5.4: Variability between the explanatory variables in two consecutive years of the panel

Explanatory Variables	Conventional Mean			Organic Mean			Organic & Fair Trade Mean		
	2010	2011	Diff	2010	2011	Diff	2010	2011	Diff
Age (in years)	50.86	50.84	-0.02	51.63	53.31	1.68	53.65	54.21	0.56
Years of schooling	9.32	9.42	0.10	9.76	9.81	0.05	7.90	7.97	0.07
Farm experience (in years)	29.42	28.92	-0.50	33.38	32.73	-0.65	33.68	33.43	-0.25
Household size	4.52	4.40	-0.12	4.39	4.40	0.01	4.22	4.29	0.07
Dependency ratio	0.42	0.39	-0.03	0.51	0.46	-0.05	0.35	0.36	0.01
Total Land size	0.79	0.72	-0.07	1.03	0.91	-0.12	1.05	1.11	0.06
Irrigation access (yes = 1)	0.62	0.10	-0.52***	0.07	0.01	-0.06**	0.03	0.35	0.32***
Extension support (yes = 1)	0.22	0.11	-0.11*	0.06	0.06	0.00	0.07	0.13	0.06
Market distance (in km)	5.90	5.39	-0.51	3.32	2.50	-0.82*	2.10	2.49	0.39*
Off-farm access (yes = 1)	0.46	0.36	-0.10	0.40	0.32	-0.08	0.42	0.44	0.02
Credit access (yes = 1)	0.81	0.82	0.01	0.97	0.85	-0.12**	0.99	0.97	-0.02
Have livestock (yes = 1)	0.59	0.55	-0.04	0.45	0.58	0.13*	0.56	0.66	0.10
Positive perception towards organic fair trade	0.26	0.11	-0.15**	0.37	0.23	-0.14**	0.58	0.57	-0.01

Note: Number of observations is 100 for all the panel years except for conventional category in 2011 which has 97 observations. Mean difference t-test depicts ***significant at 1%, **significant at 5% and * significant at 10% level

Source: Own calculation based on household survey 2011 and 2012.

The commonality among all the categories is that almost 80% of farmers reported to have credit access. Organic farmers are more dependent on farm income among the three groups. The organic and fair trade certified farmers own more livestock and have the highest positive perception towards organic fair trade agriculture which is on expected lines as per their farming choice. Organic farmers have the highest income per capita among the three categories.

The variability in the independent variables captured by the 2 years of panel is presented in table 5.4. Almost all the predictor variables report slight variability. Irrigation access significantly changes for all the three groups. It decreases for conventional and organic but both organic and fair trade certified farmers are able to increase their access to irrigation in 2011. The distance from farm to market also significantly reduces for both the categories of the certified farmers as compared to 2010. Access to credit facilities and owning livestock significantly increases for the organic farmers. It is also seen that positive perception towards organic and fair trade farming declined among conventional and organic farmers in 2011. This table (5.4) indicates the possibility of endogenous regressors in the multinomial regressions and strengthens the usage of a panel adoption model in this study.

5.4 Results

This section presents the results of the study in two parts. The first part identifies the main drivers of adoption. The second part shows the differential gains of adopting organic and both organic and fair trade in terms of total household income.

5.4.1 Adoption determinants

The multinomial estimations are presented in table 5.5. The base category is conventional farming. With reference to organic farming and both organic and fair trade certification systems, the cross-section logit (a and b) gives inconsistent results as expected. Factors represented as significant drivers in 2010 and 2011 are not constantly the same and the levels of statistical significance also changes between variables for the two years. This is because unobservable factors that affect adoption decision and endogenous regressors are not considered. Hence, the coefficients of the cross-section multinomial logit suffer from omitted variable bias and biased coefficients.

These deficiencies are overcome by the panel model (c). As significant effects are expected in between the two years as shown in table 5, fixed effects at the panel level are included for the explanatory variables. A higher number of adaptive quadrature points increases the accuracy of analysis by the multinomial model using gllamm (Rabe-Hesketh and Skrondal, 2004). Though normally 8 points are used, 16 adaptive quadrature points are used to ensure precision of results. The high correlation between the two introduced random effects in the panel model (c) indicates presence of unobserved heterogeneity in adoption decision. Hence, by controlling for unobserved heterogeneity, the panel model is more reliable in estimating adoption drivers. In panel model, the variance of random effects, var (1) and var (2) represents the tendency to choose organic against conventional and both organic and fair trade against conventional respectively. The variance for both organic and fair trade against conventional is slightly higher than that of organic against conventional. This indicates greater distance between both organic and fair trade and conventional pepper farmers than when compared to organic and conventional farmers.

All the variables are significant for organic farming in the panel model (c) except, access to credit. Older and more experienced farmers are organic adopters. The higher the farm size, the higher is the probability of organic adoption. It is interesting to note that irrigation is significant but has a negative sign. Though further study has to be done, this could be due to the fact that farmers who had access to irrigation facilities preferred to grow other high value crops like conventional cardamom. Extension support is negatively related to organic adoption which can be explained by the fact that in the survey area, in order to increase domestic production, the government through extension agencies awards around INR 26 (less than 1 US$), for every new pepper seedling planted. Though it is not directly supporting any agricultural innovation, the farmers who avail the services of the extension support naturally seem to follow conventional agriculture as indicated in table 3 as well. Owning livestock is used as an asset indicator in this study. Contrary to other findings (Feder et al., 1985), it is noted that it is negatively related to organic adoption. But, since in this study most of the support for adoption is provided by the NGO, even farmers who do not own many assets appear to be motivated to adopt organic pepper.

The variables education, household and farm size, distance to market, credit access and positive perception are significant with reference to both organic and fair trade adoption in the

panel model. The lesser educated farmers are adopters of organic fair trade. This could be because of the awareness programs conducted by the NGO in the survey area. The higher the farm size, the more driven the farmers are to adopt organic fair trade. A shorter distance to market proves an impetus to smallholders to explore organic and fair trade agriculture. This could be probably attributed to reduced transportation costs. Having an easy access to credit and a positive perception towards organic fair trade farming stimulates its adoption.

Panel adoption model accounts for endogenous regressors and unobserved variables and thereby gives reliable parameter estimates and determinants of organic and both organic and fair trade certified pepper. Hence, these results confirm the first hypothesis (a) that a panel model provides a better identification of adoption determinants. As seen from the results, in the presence of unobserved heterogeneity, panel model is more robust. The determinants for organic and for both organic and fair trade are not the same. Education is positively related to organic adoption and negatively with both organic and fair trade adoption. This could be as though education helps farmers understand the food safety, environmental and health aspects of organic pepper farming, the awareness programs conducted by the NGO seems to have played a major role in driving the less educated organic farmers to sell under fair trade marketing schemes. Credit access appears more important for organic farmers to venture into fair trade certifications though it did not play a determining role when adopting organic certification.

Overall, the total farm size plays a vital role in adoption. It is highly significant at 1% in all the models (a, b and c) for organic and both organic and fair trade adoption. Having accounted for the inherent endogeneity in the variable farm size in the panel model, it's positive and statistically high significance points that both these innovations tend to favor farmers with larger farm size. This is consistent with other findings in literature (Musara et al., 2012 and Chouichom and Yamao, 2010). Also, farmers with a larger area have easier access to credit (Weil, 1970). The variable, distance from farm to market is also highly significant at 1% for both the farming alternatives as found in other studies like Dadi et, al. (2004).

Table 5.5: MNL cross section (a) and (b) and MNL Panel gllamm (c) Results

Base Category - Conventional	**(a) 2010**		**(b) 2011**		**(c) Panel**	
Organic						
Variables	**Coef.**		**Coef.**		**Coef.**	
Age (years)	0.050		0.223		0.177	***
	(0.232)		(0.143)		(0.066)	
Age squared	-0.001		-0.002		0.002	***
	(0.002)		(0.001)		(0.000)	
Years of schooling	0.036		0.021		0.040	***
	(0.010)		(0.064)		(0.005)	
Farm experience (years)	0.128	***	0.044	*	0.072	**
	(0.033)		(0.023)		(0.033)	
Household size	-0.169		-0.133		-0.135	***
	(0.228)		(0.154)		(0.014)	
Dependency ratio	0.184		0.902	*	0.648	**
	(0.586)		(0.486)		(0.311)	
Total land size (log)	1.504	***	0.709	***	0.949	***
	(0.387)		(0.235)		(0.311)	
Irrigation access (yes = 1)	-4.471	***	-2.671	**	-3.186	***
	(0.717)		(1.150)		(0.588)	
Extension support (yes = 1)	-1.169		-0.295		-0.803	**
	(0.733)		(0.793)		(0.360)	
Market distance in km (log)	-0.749	***	-1.054	***	-0.700	***
	(0.269)		(0.279)		(0.164)	
off-farm access (yes = 1)	-0.092		0.081		0.111	**
	(0.569)		(0.354)		(0.055)	
credit access (yes = 1)	2.128	***	0.009		0.625	
	(0.703)		(0.480)		(0.782)	
have livestock (yes = 1)	-0.735		-0.345		-0.540	***
	(0.453)		(0.321)		(0.129)	
perception towards organic fair trade (positive = 1)	0.372		1.051	**	0.819	***
	(0.457)		(0.429)		(0.201)	
_Cons	-1.551		-4.911		-4.457	***
	(5.922)		(3.853)		(1.333)	

Base Category - Conventional	(a) 2010		(b) 2011		(c) Panel	
Organic and Fair Trade						
Variables	**Coef.**		**Coef.**		**Coef.**	
Age (years)	-0.077		0.161		0.088	
	(0.244)		(0.161)		(0.098)	
Age squared	-0.000		-0.001		-0.001	
	(0.002)		(0.001)		(0.001)	
Years of schooling	-0.199	*	-0.216	***	-0.190	***
	(0.107)		(0.077)		(0.003)	
Farm experience (years)	0.105	***	0.022		0.035	
	(0.037)		(0.024)		(0.033)	
Household size	-0.277		-0.279		-0.294	***
	(0.238)		(0.171)		(0.016)	
Dependency ratio	-0.299		0.829		0.414	
	(0.679)		(0.530)		(0.541)	
Total land size (log)	1.602	***	1.270	***	1.256	***
	(0.423)		(0.291)		(0.046)	
Irrigation access (yes = 1)	-5.179	***	1.085	*	-1.479	
	(0.793)		(0.567)		(2.156)	
Extension support (yes = 1)	-1.214	*	0.557		-0.549	
	(0.698)		(0.592)		(0.768)	
Market distance in km (log)	-1.164	***	-1.214	***	-0.907	***
	(0.285)		(0.332)		(0.044)	
off-farm access (yes = 1)	-0.385		0.123		0.133	
	(0.573)		(0.384)		(0.230)	
credit access (yes = 1)	4.470	***	1.545	*	2.436	**
	(1.352)		(0.797)		(1.128)	
have livestock (yes = 1)	-0.302		0.182		-0.091	
	(0.476)		(0.391)		(0.126)	
perception towards organic fair trade (positive = 1)	1.093	**	2.429	***	1.878	***
	(0.469)		(0.455)		(0.483)	
_Cons	2.572		-2.019		-0.918	
	(6.490)		(4.442)		(1.934)	

	(a) 2010	(b) 2011	(c) Panel
Log Likelihood	-200.14989	-233.78394	-485.13618
variance and co-variance of random effects			***level 2 (panel year)
var (1)			0.00013677 (0.00146036)
cov(2,1)			0.00059509 (0.00650307)
Cor (2,1)			1.00
Var (2)			0.00258918 (0.02894329)
Observations	300	297	1791

Note: Robust standard errors in parenthesis. Panel analysis using gllamm is with 16 adaptive quadrature points. ***significant at 1%, **significant at 5% and * significant at 10% level. The number of observations in panel (c) is 1791 as to incorporate random effects the MNL gllamm model expands the dataset so that there is one record for each alternative for each observation. (i.e. (300+297)*3).
Source: Own calculation based on household survey 2011 and 2012.

5.4.2 Impact Evaluation of Adoption

In this section, the differential gain of organic and organic and fair trade adoption of pepper on total household log income per capita is examined by employing PSM with multiple treatment effects as depicted in table 5.1. The logit model is used to predict the propensity scores. The nearest neighbor, one-to-one matching with a caliper of 0.02 and a kernel matching method with a caliper of 0.01 is used to estimate the impact of adoption[8]. The data was sorted randomly before matching to reduce potential bias. The evaluation is for each cross-section year separately, as there is no data before and after adoption for the same households to employ the double difference PSM approach. Nonetheless, applying PSM to each year separately enables us to establish consistency of results. All the 200 observations in each category for both the years are retained in kernel matching but only around 75% is retained after one-to-one nearest neighbor matching. The adoption effect on total log income per capita is presented in table 5.6 for the year 2010 and 2011, respectively.

[8] STATA command psmatch2 (Leuven and Sianesi, 2003) is used to estimate PSM

Table 5.6: ATT effects of adoption on log total household income per capita

Multiple treatment categories	Estimates	2010		2011	
		NN one-to-one matching (caliper 0.02)	Kernel matching (caliper 0.01)	NN one-to-one matching (caliper 0.02)	Kernel matching (caliper 0.01)
OO vs. CO	T	10.27	10.28	10.08	10.09
	C	8.93	9.17	9.66	9.46
	Difference	1.34*** (2.77)	1.11***(5.43)	0.42 (1.14)	0.63*** (3.92)
OF vs. CO	T	9.88	9.89	9.94	10.01
	C	9.07	9.10	9.32	9.51
	Difference	0.81 (1.06)	0.79*** (4.17)	0.61 (1.12)	0.50** (2.52)
OF vs. OO	T	9.89	9.89	10.01	10.01
	C	10.19	10.27	10.25	10.26
	Difference	-0.30 (-0.34)	-0.38*** (-3.39)	-0.24 (-0.31)	-0.25** (-2.07)

Note: ***significant at 1%, **significant at 5% and * significant at 10% level
T-statistics in parentheses, NN = Nearest Neighbour matching
T = Treated group and C = Control group. CO = conventional, OO = only organic certified and OF = organic and fair trade certified
Source: Own calculation based on household survey 2011 and 2012

The one-to-one and kernel matching shows that the organic adopters have a significantly higher income per capita in both 2010 and 2011. The income effect is quite remarkable in 2010 where adopters triple their household income based on the Kernel matching method, while it is about half of this difference in 2011. The change in income per capita is also positive and significant for farmers who adopt both certification schemes, again based on the kernel matching method. However the income effect is much lower than for the former group. No positive income effect can be shown for organic pepper farmers who adopt fair trade regimes in addition. To the contrary, two matching methods yield a significant negative income effect. This is due to the additional certification costs. Besides, fair trade will only yield economic benefits if the market price falls below the minimum fair trade price which was not the case in the observation years.

These Results confirm the second hypothesis of this chapter that adoption has a positive and significant impact on income as farmers practicing conventional pepper have lower income when compared to both the categories of certified farmers.

Table 5.7: Sensitivity analysis of ATT for log income per capita

	2010			2011		
Critical level of hidden bias (Γ)	OO vs. CO	OF vs. CO	OF vs. OO	OO vs. CO	OF vs. CO	OF vs. OO
NN one-to-one matching (Caliper 0.02)						
Γ = 1	<0.000	<0.000	0.001	0.000	0.001	0.032
Γ = 1.25	<0.000	<0.000	0.000	0.009	0.017	0.002
Γ = 1.50	<0.000	0.000	<0.000	0.053	0.074	0.000
Γ = 1.75	<0.000	0.000	<0.000	0.157	0.190	<0.000
Γ = 2	0.000	0.003	<0.000	0.314	0.349	<0.000
Kernel matching (Caliper 0.01)						
Γ = 1	0.000	0.000	<0.000	<0.000	<0.000	0.000
Γ = 1.25	<0.000	<0.000	<0.000	<0.000	<0.000	<0.000
Γ = 1.50	<0.000	<0.000	0.000	<0.000	<0.000	<0.000
Γ = 1.75	<0.000	<0.000	0.000	<0.000	0.000	<0.000
Γ = 2	<0.000	<0.000	0.000	<0.000	0.000	<0.000

Note: T = Treated group and C = Control group. CO = conventional, OO = only organic certified and OF = organic and fair trade certified
NN = Nearest Neighbour matching
Source: Own calculation based on household survey 2011 and 2012

To check the robustness of the PSM results to unobservable factors, the Rosenbaum (2002) sensitivity analysis is employed and its results are presented in table 5.7[9]. As the sensitivity analysis for insignificant ATT estimates is not meaningful (Hujer et al., 2004), it is omitted in the analysis. Results show that the impact findings using PSM are insensitive to hidden bias. The kernel based matching method provides the best results that are insensitive with reference to assumed hidden bias (Γ) levels (1, 1.25, 1.50, 1.75 and 2). To overcome the assumption of no hidden bias (Γ = 1), the hidden bias will need to increase by more than a factor of Γ=2 for the kernel matching of log income per capita. We can therefore deduce that even large amounts of unobserved heterogeneity will not alter the impact effects of organic and both organic and fair trade certification estimated through kernel matching. Thus, based on these Rosenbaum´s bounds results it is concludes that the ATT estimates of PSM presented in table 5 for log income per capita are robust indicators of the effect of adoption of organic and both organic and fair trade certified pepper. This strengths the finding that though adoption of both

[9] STATA command rbounds (Gangl, 2004) is used to perform the sensitivity analysis

these innovations increases total household income in comparison to conventional famers, fair trade does not add any additional benefit over organic certification.

5.5 Conclusions

In this chapter the adoption and impact of organic farming and fair trade regimes for pepper in India is analyzed. A household panel survey data of two consecutive years is used to overcome the endogeneity limitations inherent in cross-section analyses. Due to omitted variable bias, the cross-section analysis applied to both years separately did not give consistent results. However, when random effects are introduced through the panel gllamm model, unobserved heterogeneity is accounted for and robust adoption determinants are identified.

This analysis identifies the determinants of adoption in a multinomial structure. Thus the main drivers to adopt organic pepper are business motives rather than health or environmental concerns of decision makers. This is in line with other adoption studies in conventional agriculture in developing countries (e.g. Asfaw, et. al, 2009, Evenson and Gollin, 2003). Also, larger farmers and those better connected to markets tend to adopt fair trade certified pepper in addition to organic production. On the other hand the study suggests that small farmers can also shift to other high value crops such as cardamom provided they have adequate irrigation.

To estimate the differential gain of organic and both organic and fair trade adoption, the effect on the per capita income of the farm household was estimated. The causal impact analysis using three Propensity Score Matching methods (PSM) with multiple treatment effects reveals that both farmers who adopted organic as well as organic and fair trade certification schemes together achieve a higher income. However, a critical finding of this study is that in the case of pepper in India fair trade does not add any additional benefit over organic certification. This can be due to the fact that for both organic and fair trade farmers, the additional costs of certification are high which are not sufficiently rewarded by higher market prices in the observed years. Fair trade programs state that pepper farmers would get either the organic market price or the minimum fair trade price, whichever is higher. Therefore if a smallholder pepper farmer is in both regimes the advantage of fair trade prices only comes into play if market prices fall below the minimum fair trade pepper price. Hence, the major benefit of fair trade is reducing price risk in unstable markets which is the case for conventional pepper but

less so for organic. The fair trade price premium above the organic market prices is also a social premium aimed to develop the socio economic conditions of a farming community for example in terms of education and infrastructure and has other benefits than farm household income. Since fair trade regimes were only recently implemented in the study region, additional adoption of fair trade certified pepper is likely to generate benefits, the longer farmers are engaged in the fair trade regime as found by Becchetti, et. al (2011) in the case of Thai Jasmine rice.

As policy recommendations, this chapter submits that micro finance schemes and advisory services should be promoted by government to facilitate joint technological and institutional innovations in agriculture as is the case with organic farming and fair trade regimes.

More studies are needed to better understand social-based and environmentally-friendly innovations in agriculture in developing countries. As pointed out by Jena et. al, (2012) one remaining question is the integration of the different institutions and players involved in fair trade and organic systems.

CHAPTER 6

WELFARE IMPACTS OF ORGANIC AND FAIR TRADE PEPPER CERTIFICATION OF RURAL SMALLHOLDERS IN INDIA[10]

While the previous chapter discusses impact of organic and fair trade certification on total household income, it does not take the unobserved factors into consideration. This chapter further explores the effect of certification by accounting for unobserved factors and expanding the impact analysis to include household income, consumption expenditures and assets. It also further examines the effect of both these certifications in mitigating poverty. It thereby addresses the fourth and fifth objective of this thesis.

6.1 Introduction

The global market of organic produce increased three folds in ten years and reached 59 billion US$ in 2010 (Willer and Kilcher (Eds), 2012). Fair trade is also growing rapidly with sales of around 6.6 billion US$ in 2012 (Fairtrade International, 2012-13). While the major share of organic and fair trade production to date is already generated in the developing countries of Asia and Latin America,[11] the major demand for these products is in Europe and North America. The major question related to the introduction of eco-friendly farming practices and fair trade regimes in developing countries such as organic and fair trade certification is whether in addition to their ecological and social benefits these systems are also effective in contributing to increased income and the reduction of poverty. Moreover, whether organic agriculture combined with fair trade marketing systems can mutually strengthen and benefit smallholder farmers in the third world needs to be debated (Parvathi and Waibel, 2013).

Different principles govern these certifications. Where organic deals with production standards, fair trade pertains to marketing and labour conditions at the workplace. The

[10] This chapter is presented as a paper in the International Conference of the Courant Research Center and the Ibero America Institute 2014 on Poverty, Equity and Growth in Developing countries to be held in Göttingen from July 2-4, 2014

[11] A small share of organic and fair trade produce also comes from Africa.

motivation to buy organic produce is predominately related to health and environmental concerns while fair trade is perceived to reduce poverty among the smallholder producers in developing countries. Organic market prices are generally higher than conventional market prices. Fair trade has two components to its price namely a price premium and a minimum price. The price premium is a pro-poor social premium that is paid by the consumer to fair trade cooperatives to improve the social conditions in the surroundings of small scale producers like infrastructure development and education. The minimum price protects smallholders by reducing their vulnerability to market shocks.

Research on organic farming and fair trade in developing countries is growing. Organic farming literature is predominant with adoption studies (e.g. Kallas et. al, 2010). Fair trade literature has a few studies that analyze poverty reduction through participation in fair trade networks (e.g. Raynolds, 2002). Most of the organic agricultural impact research inclines towards food security, environmental aspects and soil fertility (e.g. Tilman, et. al, 2002). Nevertheless, some studies like Pimentel, et. al (2005) claim that organic farmers receive a higher net economic return per hectare when compared to conventional growers which is attributed to higher organic market prices. Moreover, Kleemann and Abdulai (2013) find that organic farmers have higher return on investment than conventional farmers. With regard to fair trade, though it has the potential to reduce poverty gaps, yet many studies suggest that the income effects from fair trade certifications may be less pronounced than the indirect benefits that farmers receive in terms of empowerment and capacity building (Raynolds, 2002). This could be because the ability of fair trade networks to provide premium prices largely depends on the global market prices of the respective product (Valkila and Nygren, 2010). Contrarily, Becchetti and Costantino (2008) argue that fair trade networks helps in improving economic well-being. This is reinforced in the study conducted by Utting (2009) among coffee farmers in Nicaragua.

In spite of the fact that having both these certifications help in reducing livelihood vulnerability (Bacon, 2005), very few studies analyze the combination of organic and fair trade arrangements (e.g. Valkila, 2009). It also needs to be noted that most of the organic and fair trade impact studies largely pertains to coffee networks. However, the additionality of fair trade over organic certification is yet to be discussed in literature. This chapter aims to bridge

this gap by examining the welfare and poverty impacts of both these innovations on smallholder farm households in a developing country setting.

This study analyses organic and fair trade certification of pepper in India. Although fair trade was introduced at least three decades ago and organic farming officially recognized by the Indian government in 2000, hardly any study is available that investigates the combined impact of both these innovations in India. In the recent past, Indian pepper crop has been floating in troubled waters. Its production and productivity declined, prompting India to import pepper (Jeromi, 2007). Degrading soil fertility, increasing input costs and fluctuating supply in the international markets has made the price and profitability from pepper unstable making pepper farmers more vulnerable to poverty. It deeply affected the major pepper growing areas like Idukki in India where 75% of the households are below the poverty line (Prakash, 2008). Moreover, there was a drastic fall in international pepper prices in 2003-04 that also affected the domestic Indian prices (Hema et.al, 2007). This sharp drop popularized fair trade certification of pepper globally in 2005 as an insurance against price shocks.

The domestic pepper scarcity also prompted many smallholder pepper farmers in India to explore alternative agricultural systems. To increase productivity by improving soil fertility and to escape the fluctuating market prices of pepper, many smallholder farmers embraced organic and fair trade certification schemes. But has adopting these innovations helped smallholder pepper farmers to perform well in contrast to conventional farmers needs to be examined.

Therefore, this study intends to analyze the welfare impact of organic and fair trade certification on smallholder pepper farmers in India and also assess the potential of these certifications in reducing rural poverty. Hence, the study has three research objectives namely; (1) to probe the effect of organic and fair trade certification on household welfare, (2) to investigate the added value of fair trade over organic certification and (3) the contribution of both these certification schemes towards reducing vulnerability to poverty.

As impact evaluation is perpetually tested with the problem of counterfactual, a multinomial selection bias corrected endogenous switching regression is used and a counterfactual analysis to study welfare impacts based on panel data is implemented. Results show that certification helps in improving household welfare. Though an additional fair trade certification does not

give any added advantage to the current income of organic farmers, it contributes to permanent income in the long run by increasing real wealth in terms of assets. Moreover it is crucial to note that both these certification regimes help in reducing vulnerability to poverty.

To systematically analyze the impact of organic and fair trade certification on household welfare and poverty, this chapter is structured as follows. The next section provides the theoretical framework and methodology. Section three describes the data and descriptive statistics. Results are presented in section four and section five concludes the chapter with some recommendations and policy implications.

6.2 Theoretical framework and methodology

In this section a framework to measure the impact of organic and fair trade pepper certification on household welfare and poverty reduction among the rural smallholders is developed.

There have been various methods to measure economic welfare. Economists have relied on measurable metrics like income and consumption expenditure as welfare indicators (Hagenaars, 1986; Ringen, 1988). While income estimation is favoured in the industrialized world, consumption expenditure is mostly used in developing countries. Also monetary poverty and poverty lines are expressed in consumption. The difficulty in measuring seasonal and self-employment earnings encourages using consumption expenditure as a substitute to measure disposable income in the Third World. However, Friedman (1957) advocates using real wealth as a key determinant of consumption. He states that consumption is dependent on permanent rather than current income. This long term average income is determined by assets of the household. Moreover, Carter and Barrett (2006) point out that if one wants to assess long term welfare then assets and asset growth is the better indicator. Hence to evaluate welfare of organic and fair trade pepper certification on smallholder households in India, all three welfare indicators; income, consumption expenditures and assets are used as dependent variables to measure current and long term impact.

Poverty is intrinsically linked to activities that generate livelihood welfare. Livelihood welfare depends on a bundle of goods as well as the characteristics of the farm households. To define poverty the value of this livelihood welfare is extremely relevant. It pertains to the optimum

utilisation of the resources available to the farm household. Hence, a measure is needed for livelihood welfare as per the classic resource definition of poverty by Sen (1981), Hagenaars (1986), Ringen (1988), and Strengmann-Kuhn (2000). Following this resource definition of welfare, a regression model is constructed with certification in organic and certification in both organic and fair trade, each serving as a resource enhancing instrument along with farm household characteristics measured in terms of human, natural, financial, social and physical capital. In this chapter, human capital refers to the age, education and farm experience of the household head, household size and dependency ratio. Natural capital pertains to farm size and irrigation access. Financial capital includes access to credits, owning wealth such as livestock and access to off-farm income. Social capital represents the support that the farmers receive through extension services and access to markets. Social networks also influences perception and attitudes the farmers develop towards an agricultural innovation. Thereby perception against organic and fair trade certification is also captured.

The analytical framework is carried out in two steps. First, a multinomial endogenous switching regression along with a counterfactual analysis is estimated to ascertain the effect of organic and fair trade certification on household welfare. This model also helps to ascertain the added value of fair trade over organic pepper. In the second stage the welfare analysis is expanded to assess the impact of these certifications on poverty alleviation and a random effects panel regression with independent poverty variables is applied.

6.2.1 Welfare impacts of organic and fair trade certification

Impact evaluation has both ex-post and ex-ante estimations. In this chapter ex-post assessment is followed, wherein the actual welfare impact accumulated by the smallholder pepper farmers due to certification is measured. The challenge in such studies is to estimate the counterfactual outcomes of certified farmers in case they were not certified and vice-versa. To overcome the problem of missing data, a counterfactual group is created following a two stage modelling framework. In the first stage a multinomial logit selection equation is estimated to ascertain the determinants of organic and fair trade pepper adoption. Then an ordinary least square (OLS) regression is estimated with the multinomial selection correction terms calculated from the multinomial logit model entering the OLS as generated regressors. In the second stage a counterfactual analysis is implemented to ascertain the impact of certification on welfare. The

average treatment effects on the treated (ATT) and the average treatment effects on the untreated (ATU) are calculated. Following Di Falco and Veronesi (2013) and Teklewold et al (2013), the multinomial selection bias corrected regression is referred as a multinomial endogenous switching regression model.

6.2.1.1 Multinomial logit selection equation

Farmers choose agricultural certifications to maximize their expected utility or profits (Dorfman, 1996 and Feder, 1980). In this study the farmer has the option of choosing between two certification strategies, organic and both organic and fair trade (C_1 and C_2) and no certification (C_0) respectively. The farm household *i* would choose certification strategy *s,* over alternative certification strategy *r,* if the expected welfare (W) the household earns from $W_{is} > W_{ir}$, $\forall\ s \neq r$. The expected welfare that a farmer will derive from implementing a particular certification strategy *s* is a latent variable W_{is}^* and it can be specified as:

$$W_{is}^* = \beta_s X_i + \varepsilon_{is} \quad (1)$$

X represents a vector of relevant explanatory variables and ε represents unobserved factors that are assumed to be independent and identically distributed random variables with zero mean. The chosen certification strategy *s* is defined as: *s = con* if no certification is chosen, *s = org* if only organic certification is chosen and *s = oft* if both organic and fair trade certification is chosen. Hence a farm household will choose strategy *oft* if *oft* helps in maximising the household´s expected welfare than choosing any other strategy *r* (Bourguignon et al, 2007). This can be stated by a multinomial logit model drawing from McFadden (1973) as:

$$\begin{pmatrix}\text{probability of farm household } i, \\ \text{choosing strategy } s\end{pmatrix} = \frac{\exp(\beta s X i)}{\sum_{r=con,org}^{oft} \exp(\beta r X i)} \quad (2)$$

The multinomial endogenous switching regression is estimated to evaluate the impact of choosing a particular certification on welfare based on Dubin and McFadden (1984) and Bourguignon et al. (2007). This model not only helps to corrects for self-selection bias but also takes into account the relations between the options of the various certification strategies (Mansur et al., 2008). A welfare outcome equation for each of the certification strategy is estimated as below:

$$W_{icon} = Q_i\alpha_{con} + \mu_{icon} \quad if\, W^*_{icon} > \max_{r \neq con} (W^*_{ir}) \tag{3a}$$

$$W_{iorg} = Q_i\alpha_{org} + \mu_{iorg} \quad if\ W^*_{iorg} > \max_{r \neq org} (W^*_{ir}) \tag{3b}$$

$$W_{ioft} = Q_i\alpha_{oft} + \mu_{ioft} \quad if\ W^*_{ioft} > \max_{r \neq oft} (W^*_{ir}) \tag{3c}$$

Q_i refers to all the explanatory variables included in X_i and the variable pepper yield. As welfare is measured in terms of household income, consumption expenditures and assets the dependent variables include log income per capita, log consumption per capita and log asset per capita. $W_{icon}, W_{iorg}\ and\ W_{ioft}$ represent all these outcome variables for each strategy respectively. μ_{icon}, μ_{iorg} and μ_{ioft} refer to the error terms distributed with zero mean and equal variance. As W_{icon}, W_{iorg} and W_{ioft} are observed only when $W^*_{icon} > \max_{r \neq con} (W^*_{ir})$, $W^*_{iorg} > \max_{r \neq org} (W^*_{ir})$ and $W^*_{ioft} > \max_{r \neq oft} (W^*_{ir})$ respectively. If the errors ε´s and μ´s are not independent and are correlated, the OLS coefficient estimates of equations (3a), (3b) and (3c) will be inconsistent. For the consistent estimation of α_s, selection correction terms generated from the selection equation (2) needs to be included. For this, the Normalized Dubin McFadden (DMF 2) model is applied which allows for linearity of errors in the outcome equation and by construction makes the errors ε´s and μ´s independent. Based on DMF 2 model the equations (3a), (3b) and (3c) are identified as:

$$W_{icon} = Q_i\alpha_{con} + \gamma_{con}\,\delta_{con} + \Omega_{icon} \quad if\, W^*_{icon} > \max_{r \neq con} (W^*_{ir}) \tag{4a}$$

$$W_{iorg} = Q_i\alpha_{org} + \gamma_{org}\,\delta_{org} + \Omega_{iorg} \quad if\ W^*_{iorg} > \max_{r \neq org} (W^*_{ir}) \tag{4b}$$

$$W_{ioft} = Q_i\alpha_{oft} + \gamma_{oft}\,\delta_{oft} + \Omega_{ioft} \quad if\ W^*_{ioft} > \max_{r \neq oft} (W^*_{ir}) \tag{4c}$$

Where γ_r refers to the covariance between ε´s and μ´s, δ_r refers to the inverse mills ratio calculated from the probabilities estimated in equation (2) and Ω_r are error terms with mean value zero computed drawing from the DMF 2 model of Bourguignon et al. (2007). To account for the heteroskedasticity arising from the generated regressors (δ_r), the standard errors are bootstrapped in equation (4a), (4b) and (4c) respectively.

As including inverse mills ratio and using standard fixed effects does not lead to consistent estimates (Wooldridge 2002), Mundlak´s fixed effects (1978) is used to control for unobservable characteristics. This method relies on the assumption that unobservable characteristics like farm management skill are a linear function of the average of the farm variant explanatory variables. Therefore farm variant variables can be used to control for farm specific effects (Udry, 1996). As pepper yield is a farm variant variable, the average log pepper yield ($\overline{\mathrm{P}\boldsymbol{i}}$) is taken and used as one of the explanatory variables in equations (4a), (4b) and (4c). It is assumed that the unobservable characteristics c_i is a linear function of $\overline{\mathrm{P}\boldsymbol{i}}$ such that $c_i = \overline{\mathrm{P}\boldsymbol{i}}\ \theta + \omega_{i,}$ where θ refers to the corresponding coefficient vectors. ω_i is a normally distributed error term with zero mean, equal variance and not correlated with $\overline{\mathrm{P}\boldsymbol{i}}$ (Di Falco and Veronesi, 2013).

For this model to be identified, selection instruments need to be included. These instruments are included based on a falsification test drawn from Di Falco et. al, (2011). They note that a variable can be used as a valid exclusion restriction, if it affects the selection of a particular certification strategy in the multinomial logit selection equation but does not affect the welfare outcome equation of those smallholder farm households that did not choose any certification strategy or for whom s = *con*. Based on this concept, perception towards organic and fair trade certification and distance from farm to market are included as exclusion restrictions. The variables perception towards organic and fair trade certification and the distance from the farm to market are jointly significant in the multinomial logit model but does not affect the welfare outcome equation of the conventional farmers as depicted in table 6.4 and appendix table 6.1 respectively.

Though the multinomial selection equation is limited by the independence of irrelevant alternatives (IIA), Bourguignon et al. (2007, p.199) state that “selection bias correction based on the multinomial logit model can provide a fairly good correction for the outcome equation, even when the IIA hypothesis is violated.”

6. 2.1.2 Estimation of treatment effects of certification

Using the above framework, the counterfactuals are calculated following Carter and Millon (2005), Di Falco and Veronesi (2013) and Teklewold et al (2013) and the average treatment effects in the actual and the counterfactual scenarios are estimated as follows:

Certified farmers choosing actual certification strategy:

$E(W_{iorg}|\ W_i = org) = Q_i\alpha_{org} + \gamma_{org}\,\delta_{org}$ (for *org* farmers choosing *org*) (5a)

$E(W_{ioft}|\ W_i = oft)_i = Q_i\alpha_{oft} + \gamma_{oft}\,\delta_{oft}$ (for *oft* farmers choosing *oft)* (5b)

Certified farmers choosing conventional farming:

$E(W_{icon}|\ W_i = org) = Q_i\alpha_{con} + \gamma_{con}\,\delta_{org}$ (for *org* farmers choosing *con*) (6a)

$E(W_{icon}|\ W_i = oft)_i = Q_i\alpha_{con} + \gamma_{con}\,\delta_{oft}$ (for *oft* farmers choosing *con)* (6b)

ATT effects are calculated as the difference between equations (5a) and (6a) and (5b) and (5c) respectively. The same approach is extended for *oft* farmers to choose *org.*

Conventional farmers choosing conventional strategy:

$E(W_{icon}|\ W_i = con) = Q_i\alpha_{con} + \gamma_{con}\,\delta_{con}$ (for *con* farmers choosing *con*)
(7a)

Conventional farmers choosing certification strategies *org* and *oft*

$E(W_{iorg}|\ W_i = con) = Q_i\alpha_{org} + \gamma_{org}\,\delta_{con}$ (for *con* choosing *org* certification) (8a)

$E(W_{ioft}|\ W_i = con) = Q_i\alpha_{oft} + \gamma_{oft}\,\delta_{con}$ (for *con* choosing *oft* certification) (8b)

ATU effects are calculated as the difference between equations (8a) and (7a) and (8b) and (7a) respectively. The same concept is extended for *org* farmers to choose *oft.*

6.2.2 Effect of organic and fair trade certification on Poverty

In the second part of the analysis poverty measure is used to ascertain the impact of organic and both organic and fair trade certification on farmers below the poverty line. We use the Foster-Greer-Thorbecke (FGT) poverty measure (Foster, et. al, 1944) as below:

$$FGT_\alpha = \frac{1}{N}\sum_{i=1}^{H}\left(\frac{z-y_i}{z}\right)^\alpha \quad (9)$$

Where z is the poverty line, y_i is the income of the i th respondent below the poverty line, N is the number of people in the economy and H is the number of households below the poverty line. The measure $\left(\frac{z-y_i}{z}\right)$ captures the income gap or shortfall of income from the poverty line. This measure is then raised to a sensitivity parameter α to capture the gravity of poverty. When α = 0, it gives the head count ratio but when α = 1 it measures the income gap ratio and α = 2 shows the severity of poverty. Following Jena et. al (2012), the income gap ratio and income gap ratio squared namely; $\left(\frac{z-y_i}{z}\right)$ and $\left(\frac{z-y_i}{z}\right)^2$ are used as dependent variable in a regression model to decipher if organic and both organic and fair trade certification has any impact on poverty mitigation. A random effects poverty regression is run only on our respondents who are classified as "poor" as per defined poverty lines. Certification is treated as a dummy variable. Only organic certification is treated as 1 for organic pepper growers and 0 for other two categories. Both organic and fair trade certification is treated as 1 for both organic and fair trade pepper growers and 0 for other categories. Hence, the poverty regression is expressed as follows:

$\left(\frac{z-y_i}{z}\right)$ = $\boldsymbol{\beta}_0$ + $\boldsymbol{\beta}_1$ Only organic certification + $\boldsymbol{\beta}_2$ Both organic and fair trade certification + $\boldsymbol{\beta}_3$ Age + $\boldsymbol{\beta}_4$ Age squared + $\boldsymbol{\beta}_5$ years of schooling + $\boldsymbol{\beta}_3$ farm experience + $\boldsymbol{\beta}_3$ total household size + $\boldsymbol{\beta}_3$ dependency ratio + $\boldsymbol{\beta}_3$ farm land size + $\boldsymbol{\beta}_3$ irrigation access + $\boldsymbol{\beta}_3$ government extension access + $\boldsymbol{\beta}_3$ credit access + $\boldsymbol{\beta}_3$ off farm income access + $\boldsymbol{\beta}_3$ owning livestock + $\boldsymbol{\beta}_3$ pepper yield + e_i (10)

The same independent variables are used for the severity of poverty equation, $\left(\frac{z-y_i}{z}\right)^2$ as well.

6.3 Data and descriptive statistics

The state of Kerala accounts for nearly 97% of the total black pepper production in India (Hema, et. al, 2007). It is the major source of agricultural employment and around two million farm households are dependent on pepper cultivation. In Kerala, Idukki is the largest pepper producing district and has around 37.9% of the total pepper area of the state (SBI, 2008 and

ESD, 2011). Hence, Idukki district is chosen as our survey area. In Idukki the taluks[12] of Udumbanchola and Peerumedu grow majority of pepper and data was collected from these areas. Both these regions share similar topography and climatic conditions.

Data from a panel survey conducted in 2011 and 2012 on 300 smallholder pepper farmers is used in the analysis. In the survey, farmers were asked about the previous production years 2010 and 2011 respectively. Panel data was collected for two successive years in order to measure changes from production decisions that go beyond one year. In terms of management regimes, there are three groups of farmers namely, (a) 100 conventional farmer, (b) 100 only organic certified farmers and (c) 100 both organic and fair trade certified farmers. The only fair trade certified pepper farmers in the survey area are large tea plantation farmers having pepper as a mixed crop. Their minimum landholding is 10 hectares. As this survey was focused on rural smallholders with a maximum of five hectares of land, there is no only fair trade certified farmers in our sample. A list of conventional farmers in the survey region was obtained from the agricultural office of the district for the regions of Udumbanchola and Peerumedu. The list of certified farmers for the two regions, organic and both organic and fair trade were acquired from the non-government organization (NGO) named Peermade Development Society (PDS), operating in the district which was also promoting organic and fair trade certification in Idukki. From these lists 100 farmers were randomly chosen for each of the management regime.

Hence from 9 villages in Udumbanchola and 5 villages in Peerumedu, a total of 300 farmers were surveyed in 2011. In 2012, due to attrition of 3 conventional farmers data was collected from 297 farmers. It was noted that there was no dis-adoption or late-adoption observed in the sample in 2012 and all farmers remained in the same category as in 2011 survey. Moreover, it was observed that organic adoption is a continuous process ranging from as early as 1997 till 2010 in the sampled households and thereby the sample covers early and late adopters. Fair trade certification was introduced in the survey area around 2005 to the already existing organic pepper growers by PDS. Some households decided to adopt the additional fair trade certification and the first year they started selling certified organic and fair trade pepper was

[12] Taluk is an administrative division of the district. It is like an entity of the local government and has certain fiscal and administrative powers over the villages and municipalities coming under its jurisdiction

in 2009. Hence, early adopters of both regimes are observed in addition to the organic pepper adopters which cover a longer adoption period.

A household survey questionnaire was used to generate information on household characteristics, agricultural activities, off-farm employment, asset endowments, credit access and consumption expenditure. A specific section was drafted on the basis of a likert scale (1 to 5) to understand their perception and attitudes towards organic and fair trade certified agriculture.

The perception variable is measured using a five point likert scale. In the questionnaire attitudes relating to soil fertility, health, environment, economic benefit and government support was rated. The response variables 1 and 2 were treated as positive and given value one and 3, 4 and 5 were considered as negative and given value zero. Then total score was calculated and all households equal to or above the mean were given the value of one and zero otherwise. This is included as a dummy variable where one is treated as a positive response. Table 6.1 describes the variables. It needs to be noted that income refers to total household income including farm and non-farm. Consumption expenditures refer to total household expenses comprising food and non-food. Total asset includes both production and household assets.

It was observed in the sample that smallholders produce pepper as a mixed crop along with other crops. As pepper is a vine, it was planted with other crops like arecanut, coconut, silver oak (timber trees) or a majority was tied to teak poles. Conventional farmers predominately combined pepper and cardamom whereas both the categories of certified farmers combined pepper with coffee. They also had a small percent of other crops like coconut, rubber, turmeric, cloves, nutmeg, arecanut, vanilla and ginger. All the crops produced are organic certified as there was no partial organic land adoption in the sample surveyed.

Moreover it is important to note that the NGO provides the needed training and technical support for adopting organic and both organic and fair trade certification. It also advances the certification costs to smallholders. The condition for the payment of certification costs is that all certified products should only be sold to the NGO (except coconut and rubber). To recover the certification costs, NGO reduces the market price for organic and both organic and fair

trade certified products. Hence, both the categories of certified farmers do not receive actual organic market prices or organic and fair trade pepper prices.

Table 6.1: Definition of variables used in regression

Variable Name	Description
Dependent variables	
Total income per capita (in INR)	Total per capita income of the household in INR (farm & non-farm) per year
Consumption expenditure per capita (in INR)	Total per capita consumption expenditures of the household in INR per year
Asset per capita (in INR)	Total per capita asset of the household in INR per year
Independent variables	
Age	Age of the household head in years
Years of schooling	Education of the household head in years
Farm experience (years)	The farming experience of the household head in years
Total Household size	Total number of members in the household
Dependency ratio	The total household members below 15 and above 65 divided by the rest of the household members
Total Land size (in ha)	The total household members
Irrigation access (yes = 1)	If the household had access to irrigation (yes = 1 and no = 0)
Extension support (yes = 1)	If the household had access to irrigation (yes = 1 and no = 0)
Credit access (yes = 1)	If the household had access to credit (yes = 1 and no = 0)
Have off farm income (yes = 1)	If the household had access to off-farm income (yes = 1 and no = 0)
Have livestock (yes = 1)	If the household has livestock (yes = 1 and no = 0)
Pepper yield	Pepper quantity produced per hectare in kg
Perception towards organic fair trade (positive = 1)	If the household has livestock (yes = 1 and no = 0)
Farm to market distance in km	The distance from farm to market in kilometers

Source: Own calculation based on household survey 2012.

Table 6.2: Descriptive statistics

Variables	Conventional Mean		Only Organic Mean		Organic and Fair Trade Mean		Total Sample Mean	
	2010	2011	2010	2011	2010	2011	2010	2011
Dependent variables								
Total income per capita (in INR)	17436.43	18054.95	49309.31	31775.14	22534.85	32387.25	29760.20	27500.23
Consumption expenditure per capita (in INR)	21012.11	17623.50	18416.03	21024.52	26656.17	22943.40	22028.10	20559.84
Asset per capita (in INR)	465188.80	423312.90	299772.80	286109.80	576779.90	418429.50	447247.20	375472.30
Independent variables								
Age	50.86	50.84	51.63	52.31	53.65	54.21	52.05	52.47
Years of schooling	9.32	9.42	9.76	9.81	7.90	7.97	8.99	9.06
Farm experience (years)	29.42	28.92	33.38	32.73	33.68	33.43	32.16	31.72
Total Household size	4.52	4.40	4.39	4.40	4.22	4.29	4.38	4.36
Dependency ratio	0.41	0.39	0.51	0.46	0.35	0.36	0.42	0.40
Total Land size (in ha)	0.79	0.72	1.03	0.91	1.05	1.11	0.96	0.92
Irrigation access (yes = 1)	0.62	0.10	0.07	0.01	0.03	0.35	0.24	0.15
Govt. Extension support (yes = 1)	0.22	0.11	0.06	0.06	0.07	0.13	0.12	0.10
NGO Support	0.00	0.00	1.00	1.00	1.00	1.00	0.67	0.67
Credit access (yes = 1)	0.81	0.82	0.97	0.85	0.99	0.97	0.92	0.88
Have off farm income (yes = 1)	0.46	0.36	0.40	0.32	0.42	0.44	0.43	0.37
Have livestock (yes = 1)	0.59	0.56	0.45	0.58	0.56	0.66	0.53	0.60
Pepper yield	512.92	596.54	872.38	1625.35	843.46	777.23	742.92	1003.78
Perception towards organic fair trade (positive = 1)	0.26	0.11	0.37	0.23	0.58	0.57	0.40	0.31
Farm to market distance in km	5.90	5.39	3.32	2.50	2.10	2.49	3.77	3.44
Number of Observations	100	97	100	100	100	100	300	297

Source: Own calculation based on household survey 2011 and 2012

The descriptive statistics are presented in table 6.2. The per capita income of conventional farmers increased in 2011 though they have the lowest per capita income in comparison to the other two groups. Organic farmers had the highest per capita income in 2010 but saw a decline in 2011. The per capita income of both organic and fair trade farmers increased in 2011. Consumption expenditure decreased for conventional and both organic and fair trade certified farmers from 2010 to 2011 whereas for organic farmers it increased in 2011. Asset per capita declined for all the categories of farmers from 2010 to 2011. Total land area is the highest among the farmers having both the certifications. Government Extension support seems to not be effective in the survey area. The certified farmers got all needed support from the NGO. The irrigation access of conventional farmers strikingly declined from 62% in 2010 to only 10% in 2011. All the three groups have more than 80% access to credit and more than30% access to off-farm income in both the years. Almost more the 45% of the households in all the groups own livestock. Yield of pepper is highest for organic farmers.

To understand whether fair trade adds additional value to organic certification a gross margin analysis is presented in table 6.3. In 2011, organic farmers have 98 and both organic and fair trade farmers have 88 observations as 2 organic and 12 both organic and fair trade certified famers stored all their pepper produce for future sales. The parameters cost of production and variable costs include material and labour costs. In 2010, there is no significant difference between the two groups except in selling price per kilogram of pepper. It is interesting to note that organic farmers were able to sell pepper at a higher rate compared to both organic and fair trade certified farmers in 2010. This may be due to the recovery of fair trade certification costs by the NGO. In 2011 all parameters show significant differences between the two groups. It shows that organic farmers perform statistically significantly better than organic and fair trade farmers in 2011 though total land area and pepper area are significantly higher for both organic and fair trade certified pepper growers. Pepper yield is significantly and strikingly higher for organic farmers.

Organic producers are able to grow pepper much more efficiently than their fair trade counterparts which are also reflected in the cost of production of a kilogram of pepper. It is interesting to observe that both organic and fair trade certified farmers have significantly higher variable costs per hectare and thereby earn less net income from pepper compared to organic smallholders. An important observation is that both organic and fair trade certified

farmers are at an average able to sell just 10% more than their cost of pepper production per kilogram. Hence, their profit margins from pepper are not very high. However as fair trade was only recently introduced in the survey, these values may not truly reflect it's potential.

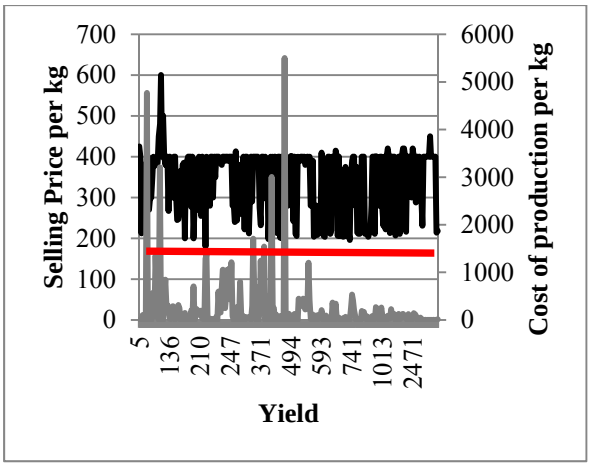
Table 6.3: Gross margins from organic and both organic and fair trade certified pepper

	2010			2011		
	Organic	**Organic & Fair Trade**	**Mean Diff**	**Organic**	**Organic & Fair Trade**	**Mean Diff**
Number of households	100	100		98	88	
Total Area (in ha)	2.55	2.60	-0.05	2.22	2.90	-0.68**
Pepper Area (in ha)	0.51	0.45	0.06	0.41	0.57	-0.16**
Pepper Yield (kg / ha)	877.32	843.47	33.85	1644.80	673.94	970.86**
Gross Income (in '000 INR/ha)	150.94	135.24	15.70	423.40	269.55	153.85
Variable costs (in '000 INR/ha)	22.71	22.35	0.36	42.59	150.57	-107.97***
Net Income (in '000 INR/ha)	128.23	112.89	15.34	380.81	118.99	261.82**
Cost of Production per kg	32.20	38.97	-6.77	81.30	346.47	-265.17***
Selling price per kg	176.21	158.56	17.65**	264.46	381.98	-117.52***

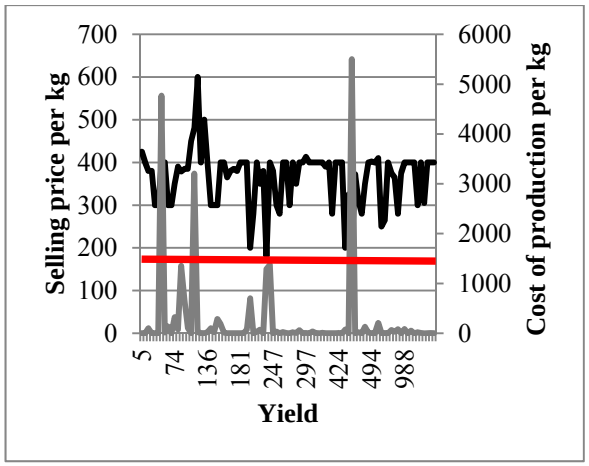
Note: T test is done on mean differences. ***significant at 1%, **significant at 5% and * significant at 10% level

Source: Own calculation based on household survey 2011 and 2012.

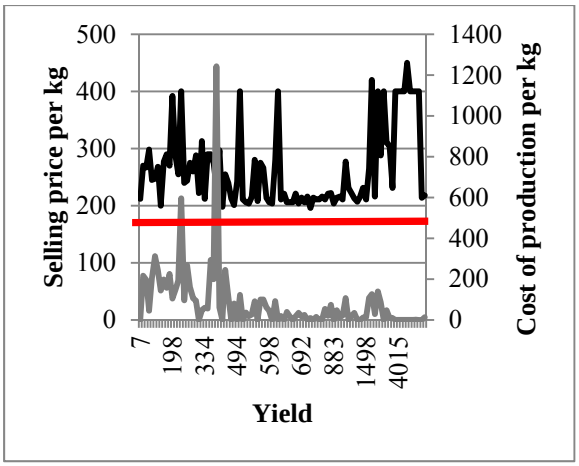
As significant differences in the gross margin analysis was found in 2011 data, we further explore the relationship between the costs of production of pepper per kilogram against the set fair trade minimum price which is at INR 175 per kg. The red line in figure 6.1 depicts the minimum fair trade price. It is observed from figure 6.1 (b) that though the distance between costs of production per kilogram of pepper and the minimum fair trade price is minimum for conventional farmers, a few are very inefficient. Most of the organic farmers (figure 6.1 (c)) are able to produce pepper much below the minimum fair trade price. Though majority of both fair trade and organic certified farmers (figure 6.1 (d)) are able to produce below fair trade minimum price there is less distance between minimum fair trade price and cost of a kilogram of pepper production.



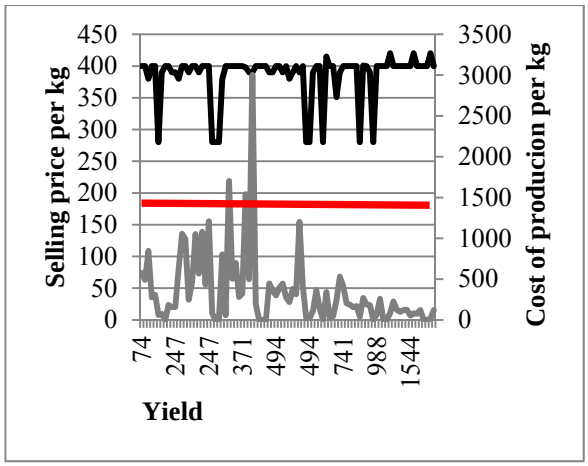
(a) All categories



(b) Conventional Pepper



(c) Organic Pepper



(d) Organic & Fair Trade Pepper

Figure 6.1: Comparison between cost of production *(grey line)* **of pepper per kg against the fair trade minimum price** *(red line)*

Note: Selling price (black line) and cost of production per kg are in Indian Rupees (INR).
Source: Own calculation based on household survey 2011.

Overall, figure 6.1 (a) depicts that fair trade certification can be beneficial only for those smallholder pepper farmers who can maximize the distance between the set minimum fair trade price for a kilogram of pepper and their cost of production for a kilogram of pepper. It only adds value to those smallholder farmers who are able to produce pepper at least equal to the set fair trade minimum price per kg so that during price fluctuations they can recover at

least their variable costs of production.

6.4 Results

6.4.1 Adoption determinates of organic and both organic and fair trade pepper

The Stata command selmlog is used (Bourguignon et al., 2002) to estimate the multinomial endogenous switching regression. The results of the pooled multinomial logit selection equation are presented in table 6.4 with conventional farmers as the base category.

Even less educated farmers are able to adopt both organic and fair trade certified pepper due to the awareness programs conducted by the NGO. The higher the farm experience the higher is the organic pepper adoption. Organic and both organic and fair trade adoption are seen more advantageous by those farmers who have lesser irrigation access. This could be because those smallholders who have adequate irrigation may shift to other high value crops like cardamom. Extension support is negatively related to organic farming as most of the certified farmers received support from the NGO and also as depicted in table 1, extension support was hardly available to all the categories of farmers including conventional. Higher access to credit increases organic and both organic and fair trade pepper adoption (e.g. Weil, 1970).

Owning livestock is used as an indicator of wealth in this study. Contrary to many findings (e.g. Feder et al., 1985) it is negatively related to organic pepper adoption. This could be because as the certified farmers receive all support from the NGO, even farmers having lower assets were able to enter organic certification programs. Consistent with literature (e.g. Musara et al., 2012 and Chouichom and Yamao, 2010) both these systems favor pepper growers with large farm size. Moreover as found in other studies (Adesina and Zinnah, 1993; Rogers, 1995; Wossink et al., 1997; Amare et al., 2012) a positive perception towards organic and fair trade certification increases its adoption. A shorter distance to market and thereby reduced transportation costs increases the adoption of both these farming alternatives as also found by Dadi et, al. (2004).

Table 6.4: Multinomial logit regression - Selection equation

Base Category - Conventional famers	Only Organic	Organic and Fair Trade
Age	0.177	0.088
	(0.138)	(0.146)
Age squared	-0.002	-0.001
	(0.001)	(0.001)
Years of schooling	0.040	-0.190**
	(0.063)	(0.067)
Farm experience (years)	0.072**	0.034
	(0.023)	(0.028)
Total Household size	-0.135	-0.294**
	(0.144)	(0.145)
Dependency ratio	0.648	0.413
	(0.413)	(0.503)
Total Land size (log)	0.949***	1.253***
	(0.219)	(0.230)
Irrigation access (yes = 1)	-3.188***	-1.481***
	(0.403)	(0.313)
Extension support (yes = 1)	-0.804*	-0.551
	(0.453)	(0.413)
Credit access (yes = 1)	0.624*	2.436***
	(0.365)	(0.686)
Have off farm income (yes = 1)	0.111	0.132
	(0.293)	(0.279)
have livestock (yes = 1)	-0.540**	-0.087
	(0.271)	(0.294)
Selection instruments		
Perception towards organic fair trade (positive = 1)	0.820**	1.876***
	(0.262)	(0.248)
Market distance in km (log)	-0.699***	-0.905***
	(0.167)	(0.171)
Constant	-4.456	-0.924
	(3.776)	(4.050)
Wald test on selection instruments (χ^2)	24.45***	77.73***
Number of Observations	597	
log pseudo likelihood	-485.14019	
Pseudo R2	0.2603	

Note: Standard errors clustered at panel level in parenthesis.
***significant at 1%, **significant at 5% and * significant at 10% level.
S*ource*: Own calculation based on household survey 2011 and 2012.

Table 6.5: Multinomial endogenous switching regression

	Conventional	Only Organic	Organic and Fair Trade	Conventional	Only Organic	Organic and Fair Trade	Conventional	Only Organic	Organic and Fair Trade
	Log income per capita			Log consumption expenditure per capita			Log asset per capita		
Age	-0.025	-0.018	0.042	-0.020	0.020	-0.011	-0.031	-0.009	0.009
	(0.063)	(0.055)	(0.053)	(0.030)	(0.035)	(0.034)	(0.038)	(0.047)	(0.040)
Age squared	0.000	0.000	-0.000	0.000	0.000	0.000	0.001	0.000	0.000
	(0.001)	(0.001)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Years of schooling	0.028	0.047	0.027	0.047**	0.026	-0.019	0.014	0.047	-0.034
	(0.038)	(0.041)	(0.027)	(0.020)	(0.019)	(0.020)	(0.027)	(0.035)	(0.025)
Farm experience (years)	0.005	-0.000	0.007	0.007	-0.007	0.005	-0.006	-0.024*	-0.020**
	(0.012)	(0.019)	(0.008)	(0.008)	(0.008)	(0.006)	(0.008)	(0.014)	(0.010)
Total Household size	-0.093	0.006	-0.176***	-0.072	-0.135***	-0.185***	-0.212***	-0.095**	-0.243***
	(0.061)	(0.061)	(0.037)	(0.059)	(0.026)	(0.034)	(0.052)	(0.047)	(0.044)
Dependency ratio	-0.047	-0.250	0.125	-0.032	-0.029	-0.081	0.021	-0.118	-0.116
	(0.202)	(0.152)	(0.164)	(0.116)	(0.087)	(0.094)	(0.124)	(0.138)	(0.129)
Total Land size (log)	0.479***	0.306**	0.184*	0.128**	0.139**	0.148**	0.431***	0.035	0.185**
	(0.117)	(0.123)	(0.109)	(0.064)	(0.068)	(0.067)	(0.085)	(0.104)	(0.082)
Irrigation access (yes = 1)	-0.180	-0.010	-0.313	-0.041	0.082	0.441**	0.251	0.447	0.293
	(0.312)	(0.604)	(0.264)	(0.191)	(0.285)	(0.199)	(0.218)	(0.514)	(0.240)
Extension support (yes = 1)	-0.162	0.298	0.133	-0.168	0.258	-0.113	-0.009	0.329*	-0.004
	(0.195)	(0.254)	(0.170)	(0.132)	(0.157)	(0.098)	(0.178)	(0.199)	(0.143)

Credit access (yes = 1)	0.217	-0.106	-0.536	0.084	0.087	-0.423	0.361**	0.052	-0.554
	(0.228)	(0.233)	(3.304)	(0.113)	(0.111)	(1.964)	(0.160)	(0.213)	(1.872)
Have off farm income (yes = 1)	1.500***	0.805***	0.457***	0.031	0.163**	0.017	0.065	-0.158	0.031
	(0.148)	(0.121)	(0.106)	(0.085)	(0.068)	(0.089)	(0.107)	(0.099)	(0.088)
have livestock (yes = 1)	0.190	-0.146	-0.111	0.100	-0.004	0.049	0.118	0.152	-0.034
	(0.171)	(0.152)	(0.099)	(0.100)	(0.077)	(0.083)	(0.123)	(0.134)	(0.108)
Pepper yield (log)	0.003	0.027	0.301***	0.013	0.050	0.142**	0.006	-0.002	0.106**
	(0.023)	(0.043)	(0.062)	(0.013)	(0.051)	(0.052)	(0.018)	(0.039)	(0.048)
Mundalk's fixed effects									
Mean pepper yield	0.001**	-0.000	0.001*	0.000	0.001**	-0.001**	0.000	0.000	0.000
	(0.001)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Selection Bias Correction terms									
_m1 (δ_{con})	0.148	-0.083	-0.486	-0.275	0.085	-0.296	0.046	1.993*	-0.159
	(0.417)	(1.265)	(0.665)	(0.260)	(0.577)	(0.426)	(0.344)	(1.024)	(0.505)
_m2 (δ_{org})	0.657	0.111	0.745	0.382	0.007	-0.889	-0.251	0.220	-0.844
	(1.035)	(0.467)	(0.748)	(0.555)	(0.239)	(0.585)	(0.774)	(0.332)	(0.710)
_m3 (δ_{oft})	0.513	-0.577	-0.213	-0.674	-0.228	-0.122	0.861	0.914	-0.299
	(0.934)	(1.377)	(0.361)	(0.573)	(0.610)	(0.219)	(0.678)	(1.099)	(0.267)
Constant	8.683***	9.848***	7.457**	9.656***	8.639***	10.750***	13.512***	13.330***	13.655***
	(1.854)	(2.410)	(3.612)	(1.030)	(1.400)	(2.233)	(1.145)	(2.052)	(2.116)

Note: Number of Observations - 597. Bootstrapped standard errors (1000 replications) in parenthesis. Fixed effects at panel level are included. $\delta_{con,}$ δ_{org} and δ_{oft} refer to selection correction terms of equation (5a), (5b) and (5c) respectively

***significant at 1%, **significant at 5% and * significant at 10% level

Source: Own calculation based on household survey 2011 and 2012.

The results of the multinomial endogenous regression model are presented in table 6.5. All the selection bias correction terms except log asset per capita for organic farmers are not significant indicating that adopting organic and both organic and fair trade certified pepper will have the same impact on non-adopters, if they choose to adopt these certification systems, as adopters.

Education helps to increase disposable income of conventional farmers. Higher farm experience reduces log asset per capita of both the categories of certified farmers. This could be because more experienced farmers may rather choose to invest their profits from farming back in agricultural expansion activities than in acquisition of assets. As expected a smaller household size increases log consumption per capita and log asset per capita for organic as well as income per capita for both organic and fair trade certified farmers. Consistent with literature all the welfare variables are positively and significantly related to farm size.

Higher irrigation access helps to increase log consumption per capita of organic and fair trade certified farmers. An increased access to government extension support would prove a positive assistance to organic farmers and access to credit facilities would help conventional farmers in increasing their assets respectively. Access to off-farm income helps to increase log income per capita for all the categories of farmers as anticipated. Increased yield would increase the welfare of both organic and fair trade farmers.

Moreover, mean pepper yield is significant for log income per capita for conventional and both organic and fair trade certified farmers. It is also significant for log consumption per capita for both the categories of certified farmers. This indicates the presence of unobserved heterogeneity in welfare outcomes. Therefore having applied Mundlak´s fixed effects based on mean pepper yield helps to control for unobserved factors.

6.4.2 ATT and ATU effects of certification

The results of the counterfactual analysis and certification impact are discussed and presented in table 6.6 and 6.7. Table 6.6 describes ATT effects of income, consumption expenditure and assets under actual and counterfactual scenarios. It compares for e.g. the actual income of organic farmers to the counterfactual income if they were conventional farmers. Table 6.7

shows the ATU effects, wherein it compares for e.g. the actual income of conventional farmers with their counterfactual incomes in case they were organic certified.

With respect to log income per capita, it is found that organic and both organic and fair trade certified farmers earn statistically and significantly more income than conventional farmers due to their respective certifications. It is also deduced from the ATT and ATU effects that if both the categories of certified farmers become conventional they will still perform better than the non-certified farmers. This indicates that there are unobserved characteristics like farm management skill that make certified farmers better. Conventional farmers can more than double their income if they choose organic and increase income by 40% if they choose both organic and fair trade certification.

However, it is interesting to note that organic farmers perform better than both organic and fair trade certified farmers. The analysis displays that organic farmers will have a 25% fall in income per capita if they choose both organic and fair trade certification. This shows that an additional fair trade certification over and above organic does not give added benefits. However as fair trade was only recently implemented, these income effects may not accurately reflect the economic benefits yet.

For log consumption expenditure per capita, ATT effects show that consumption expenditures of both the categories of certified farmers would significantly decline if they become conventional. Organic growers and both organic and fair trade certified farmers will have a fall in log consumption per capita of 17% and 25% respectively if they shift to conventional farming practices. It is also found that organic farmers will have a 13% increase in log consumption expenditure per capita if they choose both organic and fair trade certification. This indicates that an additional fair trade certification over an organic certification helps to increase disposable income. Overall, certification increases consumption expenditure in our study. As it is found that certification also increases income, this confirms to the economic theory that increases in income leads to increases in consumption expenditure.

Table 6.6: ATT effects of organic and fair trade certification

Average Treatment effects on the Treated (ATT)					
		Actual		Counterfactual	ATT
Log income per capita	Only organic farmers remain organic	10.18	If only organic farmers become conventional	9.26	0.92***
		(0.034)		(0.055)	(0.065)
	OFT farmers remain OFT certified	9.95	If OFT farmers become conventional	9.39	0.56***
		(0.025)		(0.052)	(0.058)
	OFT farmers remain OFT certified	9.95	If OFT farmers become only organic certified	10.33	-0.38***
		(0.025)		(0.029)	(0.038)
Log consumption expenditure per capita	Only organic farmers remain organic	9.80	If only organic farmers become conventional	9.61	0.19***
		(0.018)		(0.014)	(0.023)
	OFT farmers remain OFT certified	9.96	If OFT farmers become conventional	9.67	0.29***
		(0.024)		(0.017)	(0.029)
	OFT farmers remain OFT certified	9.96	If OFT farmers become only organic certified	9.88	0.08**
		(0.024)		(0.018)	(0.030)
Log asset per capita	Only organic farmers remain organic	12.41	If only organic farmers become conventional	12.78	-0.37***
		(0.024)		(0.029)	(0.036)
	OFT farmers remain OFT certified	12.79	If OFT farmers become conventional	12.78	0.01
		(0.030)		(0.031)	(0.043)
	OFT farmers remain OFT certified	12.79	If OFT farmers become only organic certified	12.54	0.25***
		(0.030)		(0.038)	(0.048)

Note: OFT denotes organic and fair trade certified. Standard errors in parenthesis. ***significant at 1%, **significant at 5% and * significant at 10% level

Source: Own calculation based on household survey 2011 and 2012.

Table 6.7: ATU effects of organic and fair trade certification

Average Treatment effects on the Untreated (ATU)					
		Counterfactual		Actual	ATU
Log income per capita	If conventional farmers adopt only organic certification	10.11	Conventional remain Conventional	9.13	0.98***
		(0.040)		(0.060)	(0.072)
	If conventional farmers adopt OFT certification	9.46	Conventional remain Conventional	9.13	0.33**
		(0.087)		(0.060)	(0.106)
	If only organic farmers adopt OFT certification	9.89	Only organic farmers remain organic	10.18	-0.29***
		(0.037)		(0.034)	(0.051)
Log consumption expenditure per capita	If conventional farmers adopt only organic certification	9.68	Conventional remain Conventional	9.65	0.03
		(0.026)		(0.017)	(0.031)
	If conventional farmers adopt OFT certification	9.66	Conventional remain Conventional	9.65	0.01
		(0.053)		(0.017)	(0.055)
	If only organic farmers adopt OFT certification	9.94	Only organic farmers remain organic	9.80	0.14***
		(0.026)		(0.018)	(0.032)
Log asset per capita	If conventional farmers adopt only organic certification	12.48	Conventional remain Conventional	12.65	-0.17*
		(0.054)		(0.038)	(0.066)
	If conventional farmers adopt OFT certification	12.36	Conventional remain Conventional	12.65	-0.29***
		(0.051)		(0.038)	(0.064)
	If only organic farmers adopt OFT certification	12.64	Only organic farmers remain organic	12.41	0.23***
		(0.032)		(0.024)	(0.041)

Note: OFT denotes organic and fair trade certified. Standard errors in parenthesis. ***significant at 1%, **significant at 5% and * significant at 10% level

Source: Own calculation based on household survey 2011 and 2012.

With regard to ATT results for log asset per capita, it is found that organic farmers will have a 3% rise in assets if they become conventional. Conventional farmers will have a decrease in assets per capita if they shift to organic and both organic and fair trade systems. This could be because assets can be sold to meet certification and other costs leading to a fall of assets after certification (Feder, et. al, 1985). Both organic and fair trade farmers will witness a 22% drop in assets if they shift to organic certification. The ATU results shows that organic farmers can increase their asset per capita by 26% if they add fair trade certification.

Hence, these results show that certification reduces asset per capita of conventional farmers. Conversely, though organic farmers experience a fall in assets when shifting from conventional practices, their assets begin to increase when they combine organic certification with fair trade marketing systems. Hence, fair trade certification does support organic farmers in enhancing their asset base. This could be because, though fair trade does not directly add to income in the short run, over time it helps to establish shorter value chains and easier access to international markets which could reduce cost and increase permanent income. As fair trade was only recently introduced in the survey region, current income does not yet mirror the exact welfare of an added fair trade certification over organic. In such a scenario, real wealth indicated by asset gives a better understanding of the causal impact of both organic and fair trade certification systems.

To summarize, analysis demonstrate that certification does help in increasing log income and consumption expenditure per capita. Permanent income measured in terms of real wealth or assets is a better indicator of the direction of impact, considering fair trade was only recently introduced for pepper in the study area. Results show that combining organic and fair trade systems are better to improve long term welfare.

6.4.3 Certification Impacts on Poverty

To apply the poverty measure a defined poverty line is needed. The World Bank has set the international poverty line for developing countries at USD 1.25 per day and USD 2 per day. India also has defined its national poverty line at INR 26 per day. This analysis converts USD into INR by adjusting for purchasing power parity and inflation.

Table 6.8: Poverty status of pepper farmers

	2010			2011			Poor in 2010 and 2011		Not poor in 2010 and 2011	
Groups	Number of Smallholders	Below INR 26/ day	Below USD 2/day	Number of Smallholders	Below INR 26/ day	Below USD 2/day	Below INR 26/ day	Below USD 2/day	Below INR 26/ day	Below USD 2/day
Conventional	100	48	68	97	46	59	27	44	32	17
Organic	100	1	9	100	6	27	0	6	93	70
Organic and fair trade	100	4	26	100	7	28	1	14	90	60
Total Sample	300	53	103	297	59	114	28	64	215	147

Source: Own calculation based on household survey 2011 and 2012.

Table 6.9: Random effects poverty regression

Variable	Income gap ratio (less than 2 USD/day)	Income gap ratio square (less than 2 USD/day)
Only Organic certification (yes =1)	-0.300***	-0.280***
	(0.048)	(0.048)
Both organic and fair trade certification (yes = 1)	-0.260***	-0.236***
	(0.044)	(0.044)
Age	-0.010	-0.010
	(0.012)	(0.014)
Age squared	0.000	0.000
	(0.001)	(0.000)
Years of schooling	-0.005	-0.009
	(0.007)	(0.007)
Farm experience (years)	-0.002	-0.002
	(0.002)	(0.002)
Total Household size	-0.018	-0.020
	(0.013)	(0.013)
Dependency ratio	-0.004	-0.003
	(0.033)	(0.036)
Total Land size (log)	-0.089***	-0.098***
	(0.021)	(0.023)
Irrigation access (yes = 1)	0.043	0.071*
	(0.040)	(0.042)
Extension support (yes = 1)	0.037	0.016
	(0.042)	(0.045)
Credit access (yes = 1)	-0.019	-0.032
	(0.042)	(0.045)
Have off farm income (yes = 1)	-0.241***	-0.250***
	(0.035)	(0.036)
have livestock (yes = 1)	0.002	-0.009
	(0.036)	(0.037)
Pepper yield (log)	0.006	0.007
	(0.005)	(0.005)
Constant	0.901**	0.776*
	(0.354)	(0.410)
Number of Observations	217	217
Overall R-sq	0.44	0.42

Note: Robust Standard errors in parenthesis computed from clustered means. ***significant at 1%, **significant at 5% and * significant at 10% level

Source: Own calculation based on household survey 2011 and 2012.

As the data collected pertains to production years 2010 and 2011 the PPP exchange rate and inflation rates of 2010 and 2011 was used. USD 1.25 approximately translates to INR 26 after adjusting for purchasing power parity (PPP) and inflation in the years 2010 and 2011. It is around INR 26.64 in 2010 and INR 27.05 in 2011. USD 2 per day equals INR 41.03 and INR 43.28 in 2010 and 2011 respectively. The USD 2 per day is used to measure poverty in this study. Hence those below INR 41.03 in 2010 and below INR 43.28 in 2011 are considered as poor in the respective years.

The poverty status of pepper farmers is presented in table 6.8. Poverty has increased from 2010 to 2011 in the sample, with a 11% increase in people living below USD 2 per day in the survey years. 18% and 20% are below INR 26 per day in 2010 and 2011 respectively. With regard to USD 2 per day 34% in 2010 and 38% in 2011 are below the poverty line. Moreover, around 10% smallholder pepper farmers are below INR 26 per day and 21% are below USD 2 per day in both years. Also, it is substantial to note that poverty is more prevalent among conventional farm households than in certified households.

To further investigate the impact of certification on those pepper households that earn below USD 2 per day in either 2011 or 2012, we apply a random effects OLS regression. As there are 103 and 114 farmers below USD 2 per day in 2011 and 2012 respectively, the poverty regression is estimated on these 217 observations as per equation 10. Results (table 6.9) show that both these certification highly and statistically significantly bring down income gap ratio and income gap ratio square. Organic certification of pepper reduces income gap ratio by 30% and severe poverty measured in terms of income gap ratio square by 28%. Both organic and fair trade certification helps to reduce poverty by 26% and chronic poverty by 24%. In effect, both these certifications are effective in helping poor farmers to overcome the shackles of vicious cycle of poverty. Other factors that help to bring down poverty among the surveyed farmers are higher farm size and access to off-farm employment which may be related to the seasonal nature of agricultural employment.

6.5 Conclusion

In this study, the welfare impacts of organic and fair trade certification of pepper in India are examined. A panel household data collected from 300 smallholder pepper farmers is used to understand the welfare impacts in terms of income, consumption expenditures and assets. A

multinomial endogenous switching regression is applied to ascertain the welfare effects. The effects of certification on poverty are further probed.

Adoption results show larger farmers and those better connected to markets are the main adopters of organic and both organic and fair trade certified pepper farming. Contrary to popular perception, organic and both organic and fair trade pepper farming is not necessarily something for small and poor farmers in remote areas as the technology has considerable demands to knowledge and infrastructure. Moreover, a larger farm size can helps smallholders in improving their welfare and reducing poverty.

Findings from the impact of certification analysis show that both the categories of certified farmers earn more income per capita than conventional growers and have higher consumption expenditures. But, fair trade certification does not add additional benefit to organic pepper in terms of income. Nevertheless, the findings from the counterfactual analysis show that an added fair trade certification will help organic pepper farmers to increase their consumption expenditures and assets. This could be because the price advantage of a fair trade certification in the short run comes into effect for organic farmers only if the organic market prices fall below the minimum fair trade price. Even in such a scenario, only those organic farmers with pepper production costs lower than the fair trade minimum price will reap profits.

The added benefit of a fair trade certification for organic pepper farmers, as shown by consumption expenditures and assets, can be attributed to forging long term relationship with importers in developed countries, access to international markets, shorter value chains, and possibility of advance payments from importers during credit crunch and a security of having a buyer for produce. As fair trade for pepper was only recently introduced in the survey region, with increasing years of association with fair trade, organic farmers may gain as pointed out by Becchetti, et. al (2011) in the case of Thai Jasmine rice.

Another critical result is that to measure impact of an intervention introduced recently, permanent rather than current income is a better indicator. Long term welfare measured based on assets is superior to gauge the implication of an added fair trade certification. Therefore this chapter submits that it is important to use asset as a measure to study impact in the context of developing countries. This also confirms with literature that rather than income,

assets are better able to establish long term economic effect of an intervention in emerging countries like India.

Another noteworthy finding is that certification does help in poverty alleviation. Organic and both organic and fair trade certification reduce the income gap between per capita income and poverty line of pepper farmers. Therefore, certification in both organic and fair trade regimes needs to be promoted to uplift the rural pepper growers in India.

Furthermore, the role of a third party in introducing and implementing these certifications needs to be recognized. The effectiveness of any certification largely depends on the local setting and in the enforcement and monitoring of the certification schemes as pointed out by Giovannucci, et. al (2008). Therefore, it is recommended that establishment of such third party support needs to be encouraged. Moreover, it is essential to integrate the different institutions and players involved in organic and fair trade systems. This helps in not only promoting eco-friendly and chemical free agriculture but can also contribute towards a sustainable socio-economic development of rural smallholder producers in developing countries.

CHAPTER 7

SYNTHESIS

7.1 Summary

The objective of this thesis is to contribute to the debate on the role of certification schemes in agriculture in developing countries. A case study of pepper in India is presented that analyses the adoption and impact of organic and fair trade certified pepper in Idukki district, Kerala. The core of this work is to examine whether it is beneficial for smallholder farmers to jointly adopt organic and fair trade certification systems. A hypothesis is framed in chapter 2 with respect to adopting both these certification arrangements in combination. This supposition is tested in the context of pepper scarcity in India through panel household survey data collected in 2011 and 2012 in chapters 4, 5 and 6.

In particular, chapter 4 explores the factors that influence farmers to adopt organic methods of chemical free production systems and its impact on yield treating for binary selection bias in the sample. Chapter 5 extends the adoption study of chapter 4 into a multinomial panel analysis. It advances the methodology of including panel data in adoption studies and thereby account for unobserved heterogeneity in adoption decision that helps in refining empirical results. It studies the drivers of adopting organic and fair trade systems by smallholder farmers and its observable impact on farm household income. The impact analysis on income is expanded to a welfare impact analysis in chapter 6. The effect of organic and fair trade systems on income as well as consumption expenditures and assets are examined, accounting for multinomial selection bias and unobservables. The effect of these certifications on poverty mitigation is also assessed. Hence, through these chapters a detailed analysis is done to test the hypothesis presented in chapter 2.

This thesis attempts to contribute to literature in the following ways:

1. From an empirical perspective this study identifies factors that influence the joint adoption and impact of two certification schemes in pepper production in India, namely organic farming and fair trade.
2. Methodologically this work is adding to current research by advancing the adoption and impact methodologies as follows:
   2.1 Using a panel model to identify adoption determinants instead of the usual cross section data.
   2.2 Expanding welfare impact by including assets as a test of Friedman´s permanent income hypothesis applied to fair trade certification and organic certification in a developing country.

This chapter provides a synthesis of the thesis work. Key findings are presented, overall conclusions are drawn and relevant recommendations and policy implications are submitted.

7.2 Key Findings

The first specific objective was to review the status of organic and fair trade in developing countries. Based on this review in chapter 2, the hypothesis is developed that the combined adoption of organic and fair trade certification is complementary and lead to higher benefits than the adoption of either innovation individually. The supposition that smallholder farmers will face welfare loss in terms of human, natural, financial and physical capital if both these innovations are not adopted in combination is tested in the context of an empirical study in the thesis.

Panel data was collected in 2011 and 2012 using household survey questionnaires in Idukki district. Data collection and sample selection procedures are elaborated in Section 3. Also, it needs to be noted that fair trade was only recently introduced in the study region in 2009 and the survey data is from 2010 and 2011. An important learning from collecting a panel data for two consecutive years is that apart from accounting for changes in farm household production decisions that go beyond one year, it enabled in enhancing methodical approach. For example, expanding adoption analysis to include panel data and thereby make an attempt to contribute to agricultural technology adoption literature.

The second specific research objective was to analyze the impact of organic adoption on production and is addressed in chapter 4. Results from the impact analysis indicate that organic adoption does help to increase productivity. However it also shows that organic adopters have unobservable skills that make them inherently better farmers than conventional pepper growers under the counterfactual setting. An interesting finding is that the impact of organic adoption on pepper productivity is smaller for adopters than for the non-adopters in the counterfactual scenario. This implies that though both adopters and non-adopters will be able to increase pepper production through organic farming, non-adopters will be more beneficial from adopting organic pepper cultivation. This implies that had non-adopters actually adopted organic methods they would have produced the same quantity of pepper as produced by the adopters. Hence, organic adoption appears to be more important to those households that have less capacity to produce. It helps these vulnerable households to close the productivity gap with the less vulnerable households.

The third specific research objective was to test the relative merit of a panel model in adoption decisions and evaluate the differential gain of adoption in terms of household income. Chapter 5 addresses this objective in detail in which both a cross section analysis applied to each year and a panel analysis was employed to decipher the adoption determinants. In the cross-section analysis, variables like farm experience, credit access, perception and dependency ratio are highly significant in one year and not significant in the other year. Also the level of significance changes for variables like access to irrigation. This is because; the cross-section multinomial adoption analysis suffers from the IIA limitation and is not able to account for unobserved heterogeneity in adoption decisions. This makes the results from the cross-section multinomial analysis inconsistent. On the other hand, the panel model is able to overcome the limitations of the cross-section analysis in the following ways, namely (a.) it overcomes the limitation of IIA by introducing random effects, (b.) effectively captures unobserved heterogeneity as the introduced random effects are alternative specific and enables capturing unobserved farm and individual characteristics and (c.) it captures individual choices that may not likely be independent by using repeated observations for the same household sharing the same unobserved random effects. Hence, the findings from the panel adoption model are better able to identify adoption determinants. The results indicate that large farmers having better access to markets are the chief adopters of organic and fair

trade arrangements. An important finding of this chapter is though certification helps in increasing total household income; fair trade does not add any additional benefit to organic certified farmers based on observable characteristics.

The fourth objective was to expand the impact analysis in chapter 5 to include consumption expenditures and assets and employ a panel welfare analysis accounting for multinomial selection bias and unobserved characteristics. In chapter 6 the question is raised if fair trade certification offers an additional value to organic pepper farmers. Results show that both these certification does help in improving welfare in comparison to non-adopters. However, the analysis reiterated the finding in chapter 5 that fair trade did not add any additional benefit to organic pepper growers in terms of household income. But the counterfactual analysis on consumption expenditures suggests that organic farmers could significantly increase their consumption if they adopted organic fair trade. The counterfactual examination of assets also reinforce that on the long run organic farmers will be much better off if they adopt organic and fair trade certification in combination. This is indicated in the significant increase in permanent income of the smallholder pepper farmer.

The fifth objective was to assess the effects of organic and fair trade certification of pepper on farmers below the poverty line. FGT poverty measure was employed in which the income gap ratio and income gap ratio squared are used as dependent variables in a regression model to analyze if organic and both organic and fair trade certification has any impact on poverty mitigation. Results from the poverty regression show that organic and both organic and fair trade certifications are highly significant in reducing the shortfall of income from the poverty line. Regression results indicate that having organic or both organic and fair trade certification can likely help in reducing the severity of poverty by 28% and 24% respectively.

Hence, the hypothesis presented in chapter 2 is not rejected that the combined adoption of organic and fair trade certification is better to improve long term household welfare among the rural smallholder pepper farmers in India.

7.3 Conclusions and Recommendations

The results from chapters 4, 5 and 6 allow drawing conclusions and submitting recommendations for policy makers. The results from chapter 4 indicate that pepper production can also be increased through organic agriculture. Therefore, to combat the fall in domestic pepper production and reduce dependence on imports, organic farming is an alternative, especially for the vulnerable farmers with less production capacity. Hence, India should promote policies that also encourage organic pepper agriculture. It should develop measures to provide extension support on technical aspects of organic production. These findings are also relevant to design effective strategies that promote organic pepper agriculture and certification in other developing countries.

The analyses in chapter 5 showed that farm size and distance to market plays a huge role in organic and both organic and fair trade adoption. This indicates that contrary to general perception these certification systems may not necessarily be for the poor and remote farmers with marginal landholdings. Organic and fair trade arrangements may apply better to large farmers because of their access to information and infrastructure. The finding from income impact analysis indicates that fair trade does not add value to organic certification. As fair trade was a recent introduction in the study region it is likely to underestimate the impact on current income. This is because in the short run only price effect between the two certification systems can be captured. But, organic and fair trade certified pepper farmers will only have a price advantage over their organic counterparts if the organic market price of pepper falls below the minimum fair price designated for pepper. Therefore, as there was no fall in organic pepper prices below fair trade minimum prices of pepper during the production years 2010 and 2011, whether fair trade adds additional value to organic pepper farmers is not effectively captured.

However when the impact analysis is expanded to consumption expenditures and assets in chapter 6, it is comprehended that fair trade certification does provide an added value to organic farmers and it is better to adopt both these certification systems in combination. This indicates that joint organic and fair trade certified pepper growers will increase their long term welfare. Thus, assets are a better measure to assess the impact of an intervention recently introduced. The added benefit from fair trade certification to organic pepper farmers can be

attributed to the social benefits of fair trade like access to better infrastructure as well as protection from market price shocks in the form of minimum price guarantee. These social benefits help to reduce variable costs over time and increase profit from pepper, which is reflected in the permanent income analysis. Moreover, results of the poverty regression indicate that both these certifications help in reducing the income gap between per capita income and poverty line and thereby mitigate poverty.

Therefore, this research shows that India needs to promote adoption of organic and fair trade certification of pepper in combination to not only increase domestic production but also to benefit its smallholder farmers in the long run. Combining organic methods of production with fair trade marketing practices does have the potential to enhance food safety to consumers and uplift the social and economic conditions of smallholder pepper producers in India. Hence, this thesis submits that designing policies that support organic and fair trade adoption contribute in helping India meet the challenges of pepper scarcity and contribute to the economic well-being of its smallholder pepper farmers.

It is suggested that the methodology used in this study, namely a panel adoption model and an asset-based welfare impact analysis could be applied to other crops and other developing countries to examine agricultural technology adoption decisions. It will be useful to assess if the findings of this study that organic farming can be used as a strategy by the vulnerable farmers to increase production also applies to other cases. As pointed out by Sinkkonen (2002) certain crops are more suitable for organic agriculture than others. Therefore, more studies are needed to establish the economic and production value of converting other crop farming into organic agriculture. The fair trade model is not crop or country specific and if implemented appropriately should reap benefits. Though, fair trade marketing is considered more suitable for crops that have high market price fluctuations, it is nevertheless essential to create programs that spread awareness of fair trade certification to help smallholder farmers in developing countries get access to information and knowledge. Policies needs to be planned that support even the less literate farmers to be able to establish fair trade cooperatives.

To sum up, this thesis submits that organic and fair trade certification systems have a role to play in uplifting the smallholder farmers in the agrarian dependent Third World towards a better economic future. But these are not the only issues in agriculture. World agriculture including livestock, fisheries and forestry has concerns regarding environmental degradation, shortage of resources and climate change. Food security and adequate nutrition to meet the needs of the growing global population is becoming a challenge. There are always remaining gaps, though this research has added to an improved understanding of organic and fair trade certification of pepper in combination.

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APPENDICES

APPENDIX A: TABLES

Table A4.1. Test of validity of selection instruments (binary)

Selection instruments : Perception variables - risky, soil fertility and food safety & distance from farm to market in km (log)

Test on validity of selection instruments	Adoption (1/0)	Log quantity produced per hectare for non-adopters
Household characteristics		
Age	-0.453***	0.034
Years of schooling	-0.099**	0.046
Farm experience	0.037***	-0.028
Total household Size	-0.069	0.044
Dependency ratio	0.258	0.079
Access to credit	-0.854	0.274
Access to off-farm income	0.136	0.063
Assets		
Livestock	-0.225	-0.072
Production Asset	1.702***	0.336
Variable costs per ha (log)	0.040***	0.006
Inputs		
labour use		0.001
fertiliser and Manure use		0.000
perception		
Risky	-0.551***	-0.081
Soil Fertility	0.757***	0.100
Food Safety	0.225	0.106
Distance to market (log)	-0.656***	0.263
Constant	2.742***	3.199**
Wald test on perception variables and distance to market (log)	$\chi^2 = 38.43$***	F. Stat = 0.53
Sample size	290	90

Source: author´s own calculation based on household survey 2012

Table A5.1. Description and summary statistics of variables

Variable name	Description of variable	Mean	SD
Age	Age of the household head in years	52.26	11.39
Years of schooling	Education of the household head in years	9.03	3.21
Farm experience	The farming experience of the household head in years	31.94	12.63
Household size	Total number of members in the household	4.37	1.38
Dependency ratio	The total household members below 15 and above 65 divided by the rest of the household members	0.41	0.51
Total land size	Total size of the farm in hectares	0.94	0.66
Irrigation access	If the household had access to irrigation (yes = 1 and no = 0)	0.20	0.40
Extension support	If the household had access to extension support (yes = 1 and no = 0)	0.11	0.31
Market distance	The distance from farm to market in kilometers	3.61	10.85
Off-farm access	If the household had access to off-farm income (yes = 1 and no = 0)	0.40	0.49
Credit access	If the household had access to credit (yes = 1 and no = 0)	0.90	0.30
Have livestock	If the household has livestock (yes = 1 and no = 0)	0.57	0.50
Positive perception towards organic fair trade	If the household has positive perception towards organic and fair trade (yes = 1 and no = 0)	0.36	0.48
Income impact dependent variable			
Total income per capita (INR)	It is total per capita household income including farm and non-farm income per year	28636	61073

Note: Observations - 597
Source: Own compilation based on household survey 2011 and 2012

Table A6.1. Test of validity of selection instruments (multinomial)

For households that did not use any certification strategy and follow conventional farming

	Log income per capita	Log consumption expenditure per capita	Log asset per capita
Age	-0.035	-0.034	-0.027
	(0.062)	(0.024)	(0.033)
Age squared	0.000	0.000	0.000
	(0.001)	(0.000)	(0.000)
Years of schooling	0.032	0.029**	0.036*
	(0.030)	(0.013)	(0.021)
Farm experience (years)	0.001	0.000	-0.004
	(0.009)	(0.006)	(0.007)
Total Household size	-0.083	-0.065	-0.199***
	(0.055)	(0.060)	(0.050)
Dependency ratio	-0.077	-0.105	0.039
	(0.189)	(0.097)	(0.107)
Total Land size (log)	0.407***	0.085*	0.379***
	(0.088)	(0.046)	(0.056)
Irrigation access (yes = 1)	-0.002	0.230**	0.191
	(0.171)	(0.101)	(0.118)
Extension support (yes = 1)	-0.129	-0.149	-0.005
	(0.173)	(0.113)	(0.161)
Credit access (yes = 1)	0.145	0.128	0.212
	(0.204)	(0.092)	(0.133)
Have off farm income (yes = 1)	1.498***	0.037	0.039
	(0.135)	(0.078)	(0.105)
Have livestock (yes = 1)	0.211	0.148*	0.087
	(0.148)	(0.089)	(0.109)
Pepper yield (log)	0.003	0.011	0.009
	(0.015)	(0.011)	(0.018)
Mundalk´s fixed effects			
Mean pepper yield	0.001**	0.000	0.000
	(0.001)	(0.000)	(0.000)
Selection instruments			
Perception towards organic fair trade (positive = 1)	-0.023	0.162	-0.124
	(0.160)	(0.106)	(0.150)
Market distance in km (log)	0.064	0.063*	0.024
	(0.065)	(0.036)	(0.054)

Constant	8.557***	9.867***	13.051***
	(1.766)	(0.834)	(0.977)
Wald test on selection instruments (F-stat)	0.480	2.180	0.450
R^2	0.470	0.174	0.394
Adjusted R2	0.422	0.101	0.340
Sample size		197	

Note: Robust standard errors in parenthesis. Mundlak´s fixed effects at panel level are included

***significant at 1%, **significant at 5% and * significant at 10% level

Source: Own calculation based on household survey 2011 and 2012.

APPENDIX B: HOUSEHOLD QUESTIONNAIRE 2011

Questionnaire number

Household Survey Kerala, India
2011

Introductory Statement

We are German university researchers working on a project to study the livelihood systems of Black Pepper farmers in India. We are especially interested in the role of risk in the livelihood of these farmers. To achieve the objective of our research we kindly ask for your cooperation.

We assure you that all information you give during the interview is kept strictly confidential. Data will be used for scientific purposes only and will not be given to any outside person.

Section 1 - SURVEY INFORMATION

0 Questionnaire ID

1 Sub District /Block Name

2 Village Name

9 Date of Interview(dd/mm/yy)

10 Time Started (hh:mm)

11 Time Finished (hh:mm)

3 Type of Household

- Both Organic & Fair Trade Certified
- Conventional Farming
- Only Fair Trade Certified
- Only Organic Certified

4 Address of the household

12 Phone No

5 Name of the Household Head

6 Name of Respondent

13 Respondent I.D. Code (A)

7 Name of Interviewer

8 Name of Supervisor

Code A

1 Household Head
2 Wife
3 Son/daughter (incld.adopted)
4 son/ daughter in law
5 Father/Mother
6 Father/Mother in law
7 Sister / Brother
8 Grandchild
9 other relatives
10 non-relatives
97 Don´t know
98 No answer

14 Notes:

Section 2 HH Member Codes

Code A

1 Household Head
2 Wife
3 Son/ daughter (incld. adopted)
4 son/ daughter in law
5 Father/Mother
6 Father/ Mother in law
7 Sister / Brother
8 Grandchild
9 other relatives
10 non-relatives
97 Don´t know
98 No answer

Code B

1 Unmaried
2 Married
3 Divorced/ separated
4 Divorced/ separated
98 No answer
99 not applicable

Code C

0 None
1 Primary School (Std 1- 5)
2 Secondary School (Std 6- 10)
3 Higher Secondary School(Std 11-12)
4 Diploma
5 Graduate
6 Master
7 Doctorate

Code D

1 Engaged in own Agriculture
2 Non-farm owned business
3 Agricultural labour working in other farms
4 non-agricultural labor inside district
5 non-agricultural labor outside the district
5 Governement official
6 Housewife
7 Student
8 Child below school age
9 Unemployed
90 Others, pls specify

Code E

1 Scheduled Tribe
2 Scheduled Caste
3 Other Backward caste
4 Forward Caste
90 Others, specify
98 no answer

Code F

1 Hindu
2 Christian
3 Muslim
4 Jews
5 Atheist
90 others, specify

Section 2 - HOUSEHOLD MEMBER DETAILS

Please record details between 1st Dec 2009 and 30th Nov 2010

0	1	2	3	4	5	6	7	8	9	10	10	11	12	13	14
Member ID Code	Name	Relation to family Head	Gender	Age (in Yrs)	Marital status	Education	Occupation I	Occupation II	Average Total Gross Income earned per Year (in Rs.)		Months lived in HH in the given period	No of times, left the HH to work outside	Caste	Religion	Years of farming experience
		A	1= Male, 2= Female	For children < 1 yr put 0	B	C	D	D	Farm Income	Non-Farm Income	(in months)	(number of times)	E	F	(in Yrs)
01															
02															
03															
04															
05															
06															
07															
08															
09															
10															
11															
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21															
22															
23															
24															
25															

Section 3 - HOUSING DETAILS

Please record details between 1st Dec 2009 and 30th Nov 2010

1	2	3	4	5	6	7	8	9
Type of housing of the HH	House Owned / Rented (If Ans is 2, then goto Q 3 esle Q4)	If rented, amount per month	Total No of rooms (apart fom Kitchen and Bathroom)	Area	Travel Distance from HH to Bank		Travel Distance from HH to Market	
A	B	(Amt in Rs)		(in m^2)	Time (in min)	Distance (km)	Time (min)	Distance (km)

Code A

1 Mud-wall house(kaccha)
2 Mixed mud & stone house
3 Stone House (pakka)
4 Bunglow style
5 two-storey house
6 More than 2 storey house
90 Others, Pls specify
97 don't know
98 no answer

Code B

1 Owned
2 Rented

Section 4 - AGRICULTURE DETAILS

Please record details between 1st Dec 2009 and 30th Nov 2010

1	2	3	4	5
Total Agricultural Area	Owned	Estimated Selling price per acre	Area Owned (in acres)	Irrigated Area Owned (in acres)
	Leased	Rent per acre perYear	Area Leased (in acres)	Irrigated Area Leased (in acres)
	Others, pls specify			

*** If area is less than 0.5 acre and only in cents..then pls specify area in cents**

Continued…..

Section 4 - Agricultural Details Codes

Code A	Code B	Code C	Code D
1 Pepper	1 tonnes	1 Black pepper	1 In the same village
2 Arecanut	2 kilogram	2 Green pepper	2 in the same sub district
3 Coconut	3 pieces	3 White pepper	3 In the same district
4 Cardamom	4 bundle	90 Others, pls specify	4 in the same state
5 Tea	90 Others, specify		5 in other states of India
6 Coffee	98 no answer		6 Abroad
7 Rubber	99 not applicable		97 Don´t know
90 Others, specify			

Section 4 - AGRICULTURE DETAILS (Contd..)

Please record details between 1st Dec 2009 and 30th Nov 2010

6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
Crops ID (crops per acre)	Crop Variety	Area Planted	Planting perriod from…(n case of perinial crops growing longer than 1 year : year of planting)	Harvesting Period.		Total Production	Unit for Quantities	Usage of Production					Sales Price	Product Quality	Where is the market you sell?	Travel Distance to the market from the farm	
								Home consumption (members)	Home Consumption (Livestock)	Household Processing	..in kind payments for labour, machine rental, loan repayments	Sales					
A		(in acres)	Month (or year)	From Month	To Month	Qty	B	Qty	Qty	Qty	Qty	Qty	(in Rs per quantity)	C	D	Time in Minutes	Distance in Km

Section 4 - Agricultural Details Codes

Code A	Code E
1 Pepper	1 Owned
2 Arecanut	2 rented
3 Coconut	3 Borrowed (no fee paid)
4 Cardamom	90 Others, specify
5 Tea	97 Don´t know
6 Coffee	98 no answer
7 Rubber	99 not applicable
90 Others, specify	

Section 4 - AGRICULTURE DETAILS (Contd..)

Please record details between 1st Dec 2009 and 30th Nov 2010

6	24	25	26	27	28	29	30	31	32	33	34	35	36
Crops ID (crops per acre)	Expenditures for land preparation for this crop			Expenditures for seeds,seedlings & planting		Expenditures for hand weeding (hired labor)*	Expenditures for fertiliser application		Expenditures for pesticides(herbicides, insecticides, fungicides)		Expenditures for harvesting incl. Threshing if required		Irrigation Expenses
	Machine used is…	Variable machine cost	Hired labor including food, drinks	Seeds and Seedlings	Hired labor including food, drinks		Materials	Hired labor including food, drinks	Materials	Hired labor including food, drinks	Machinery cost	Hired labor including food, drinks	
A	E	(in Rs.)	(in Rs.)	(in Rs.)	(in Rs.)	(in Rs.)	(in Rs.)	(in Rs.)	(in Rs.)	(in Rs.)	(in Rs.)	(in Rs.)	(in Rs.)

Section 4 - AGRICULTURE DETAILS (Contd..)

Please record details between 1st Dec 2009 and 30th Nov 2010

6	37	38	39
Crops ID	Do you store the crop?	How much stored as of today (date of interview)	Please estimate its current value if you had to sell it
A	A	Qty	(in Rs.)

Code A

1 Yes
2 No
97 Don't know
98 No answer

Section 4.1 - LIVESTOCK & AQUACULTURE

Please record details between 1stDec 2009 and 30th Nov 2010

1 Did you produce livestock product between 1 Dec 2009 and 30 Nov 2010? ☐ 1. Yes ☐ 2. No, go to Section 4.2

Now, please list and quantify livestock products produced between 1 Dec 2009 and 30 Nov 2010

	2	3	4	5	6	7	8
No ID	Livestock product	total production	home consumption	Quantity Sold	Estimated Sales Value	Package costs	Storage Costs
		(individual unit)	(individual unit)	(individual unit)	(in Rs.)	(in Rs.)	(in Rs.)
1	Milk						
2	Calves (heads)						
3	Piglets						
4	Chicken Eggs (Pieces)						
5	Duck eggs (pieces)						
6	Sheep wool						
7	Goat						
8	Milk given to other animals in the household						
9	others, specify						
10	others, specify						

Section 4.2 - FISHING, HUNTING, COLLECTING, LOGGING

Please record details between 1st Dec 2009 to 30th Nov 2010

1 Is your household involved in fishing, hunting, collecting or logging?

	1. Yes
	2. No, go to Section 5

	2	3	4	5	6	7	8	9	10	11	12
No ID	Type of activity	Access Fee	Total Expense	What is th normal season for this activity		Type of produce extracted	total Output (in the given period)	Specify unit	Home consumption	Qty sold in the market	Estimated selling prie
	A	(in Rs.)	(in Rs.)	From Month	To Month	(eg. Shrimp, honey etc)	(individual unit)	C	(in unit specified in Q 8)	(in unit specified in Q 8)	(in Rs.)
1											
2											
3											
4											
5											

Code A

1 fishing
2 hunting / catching
3 collecting
4 logging
5 Others, pls specify

Code C

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

Section 5 - Organic & Fair trade details

Code A
1. Conventional Farming
2. Only Organic certified
3. Only Fair Trade certified
4. Both organic and Fair Trade certifie

Code B
0 No support received
1 Training
2 Financial support
3 Oranising Organic seeds
4 Support during organic conversion period
5 Marketing support
6 Certification help
7 Technology support
90 Others. Pls specify

Code C
0. No support received
1. Free technology training
2. Subsidised electricity charges
3. Payment for labour above certain number
4. Extra subsidy if organic farming is undertaken
90. Others, please specify

Code D
1. Improvement in standard of living
2. Increase in Income
3. Atleast a minimum price is assured in Fair trade
4. Soil improvement
5. Increase in productivity
6. Better yields
7. Environment friendly
8. Low input costs
9. Protection against pests and diseases
90. Others, pls specify

Code E
1. Lack of Labour
2. High Labour costs
3. Soil deterioration
4. pest and diseases
5. high cost of external farm inputs
6. Human Health problems due to pes
7. Organic certification costs
8. Fair trade certification costs
9. Loss of yield during organic conversion
10. Low Output prices
11. Not aware of fir trade
90. Others, Pls specify

Code F
1 Will further expand the area
2 Will reduce the area
3 Will retain the same area
4 Apart from farming will venture into non-farm business
5 Will come out of farming

Code G
0 No future plans
1 Diversification into new crops
2 Diversification into new product markets without any relation to former activities
3 Diversification into farm processsinh
4 Diversification into Direct marketing
5 crop specialisatoin
6 Livestock specialisation

Section 5 - ORGANIC & FAIR TRADE DETAILS OF THE HOUSEHOLD

1	2	3	4	5	6	7
Farming Practice of the HH	From When	Type of support received from Local NGO	Type of support received from Govt. Extension agencies		Benefits received	Problems Faced
			In Kind support	Cash subsidy support		
Code A	(Year)	Code B	Code C	(in Rs per year)	Code D	Code E
			1)		1)	1)
			2)		2)	2)
			3)		3)	3)

8	9	10
What are your future prospects?	How much will you invest in future to develop your farm?	What are your future farming operation plans?
Code F	(in Rs. Per acre) (0 if no investment)	Code G

OFT Codes

Code A
1- Yes
2. No
97. Don´t know
98.No Answer

Code B
1 Their soil has deteriorated, want to improve
2 Due to health concerns
3 Do to environmental concerns
4 Higher output price
5 Low input cost
6 Organic better controls pests & diseases
7 Better export opportunity
8 Community support
9 Friends and family support
10 Governemnt support
90 Others, pls specify

Code C
1. High labour costs
2. Lack of labour supply
3. High organic certification costs
4. Low yields during conversion
5. Lack of domestic demand
6. Lower yields compared to conventional
7. Lack of government support
8. Lack of community support
9- Lack of friends and family support
90. Others, pls specify

Code D
1.Not aware of Fair trade
2. High Fair trade certification costs
3. Not interested in export
4. Membership difficult in existing cooperatives or farmer association bodies
5. Difficult to start a cooperative or farmer association bodies
6. Difficult to maintain a cooperative or farmer association bodies
7. Difficulty in meeting with fair trade Labour standards
8. Lack of community support
9. Lack of Government support
10. Competitive output prices available in local markets
11. Lack of friends and family support
90. Others, pls specify

Code E
1. Minimum fair price assured
2. Improves standard of living
3. Lack of domestic demand
4. Want to export
5. Promotes Gender Equity
6. Develpos producer independence
7. Better Labour working conditions
8. Support available from NGOs
9. Support available from Government
10. Transparent suppy chains
11. Friends and family support
12. Community supoor
90. Others, pls specify

For conventional farming practicing Households only

11	12	13	14	15	16
Will you adopt certified organic farming in future?	If Q8, is yes, reasons	If Q8, is no, reasons	Will you market through Fair Trade in future?	If Q11, is yes, reasons	If Q11, is no, reasons
Code A	Code B	Code C	Code A	Code D	Code E
	1)	1)		1)	1)
	2)	2)		2)	2)
	3)	3)		3)	3)

For Only Organic certified Households

17	18	19	20	21	22	23	24	25
When did you decide to adopt organic cultivation?	From When did you start selling as certified organic?	Reasons for adopting organic	Will you continue to be organic certified in Future?	If No, reasons	Are you aware of Fair Trade	Will you adopt Fair Trade in future?	If Q11, is yes, reasons	If Q11, is no, reasons
Year	Year	Code B	Code A	Code C	Code A	Code A	Code D	Code E
		1)		1)			1)	1)
		2)		2)			2)	2)
		3)		3)			3)	3)

OFT Codes

Code A
1- Yes
2. No
97. Don´t know
98.No Answer

Code B
1 Their soil has deteriorated, want to improve
2 Due to health concerns
3 Do to environmental concerns
4 Higher output price
5 Low input cost
6 Organic better controls pests & diseases
7 Better export opportunity
8 Community support
9 Friends and family support
10 Governemnt support
90 Others, pls specify

Code C
1. High labour costs
2. Lack of labour supply
3. High organic certification costs
4. Low yields during conversion
5. Lack of domestic demand
6. Lower yields compared to conventi
7. Lack of government support
8. Lack of community support
9- Lack of friends and family support
90. Others, pls specify

Code D
1.Not aware of Fair trade
2. High Fair trade certification costs
3. Not interested in export
4. Membership difficult in existing cooperatives or farmer association bodies
5. Difficult to start a cooperative or farmer association bodies
6. Difficult to maintain a cooperative or farmer association bodies
7. Difficulty in meeting with fair trade Labour standards
8. Lack of community support
9. Lack of Government support
10. Competitive output prices available in local markets
11. Lack of friends and family support
90. Others, pls specify

Code E
1. Minimum fair price assured
2. Improves standard of living
3. Lack of domestic demand
4. Want to export
5. Promotes Gender Equity
6. Develpos producer independence
7. Better Labour working conditions
8. Support available from NGOs
9. Support available from Governmer
10. Transparent suppy chains
11. Friends and family support
12. Community supooc
90. Others, pls specify

For Both Organic and Fair Trade certified Households only

26	27	28	29	30	31	32	33	34
When did you decide to adopt organic cultivation?	From When did you start selling as certified organic?	Reasons for adopting organic	When did you decide to market through Fair Trade?	From When did you start selling through fair trade	Reasons for marketing through fair trade	Will you continue to be both organic & Fair trade certified in Future?	If No, reasons	List 3 benefits of organic cultivation apart from income & consumption
Year	Year	Code B	Year	Year	Code D	Code A	Code C & E	(open-ended Q)
		1)			1)		1)	1)
		2)			2)		2)	2)
		3)			3)		3)	3)

Please rank in order of preference , if the interview says no benefits (0) then move to the next question in the table

		35	36	37	38
	What is the perception of the houshold head towards.. (Please rank 1 to 5 in order of preference)	Conventional Farming	Organic farming	Fair Trade marketing	Organic farming under fair trade marketing
0	Has No Benefits				
1	Improves Income of the Household				
2	Improves standard of living of the household				
3	Improves supply of healthy foods				
4	Reduces environmental pollution				
5	Improves soil fertility				
90	Others, pls specify				
97	Don´t know				

Section 6 - Off -Farm Employment Codes

Code A

1 Agricultural Wage Laborer for other
2 Logger for others
3 fisher for others
4 Factory worker
5 Construction worker
6 Government worker
7 Cook
8 Tailor
9 Vendor
10 Driver
11 cleaner / Housemaid
12 Carpenter
13 Mechanic
14 Electrician
15 Plumer
16 Rice Mill Owner
90 Others, specify
97 Don´t know
98 no answer

Code B

1 In the same village
2 in the same sub district
3 In the same district
4 in the same state
5 in other states of India
6 Abroad
97 Don´t know
98 no answer

Code C

1 Unlimited
2 Limited
3 Day to Day
4 verbal agreement/no contract
90 Others, specify
97 Don´t know
98 no answer
99 not applicable

Code D

1 Yes
2 No
97 Don´t know
98 no answer

Code E

1 accomodation
2 food
3 transport
4 insurance
90 Others, specify
97 Don´t know
98 no answer

Section 6 - OFF FARM EMPLOYMENT

Please record details between 1st Dec 2009 to 30th Nov 2010

By off-farm employment we refer to all activities not related to agricultural production on your own farm.
First, we ask you about the wage-employed activities, for example: agricultural worker on other farms, factory worker, construction worker, service worker ...).

1. **Has anyone of your household members worked as a wage-emloyee between 1st Dec 2009 & 30th Nov 2010?** ☐ 1. Yes ☐ 2. No, go to next Section

2. **How many members of your household have worked as a wage-employee between 1st Dec 2009 & 30th Nov 2010?** ☐ person (s)

3	4	5	6	7	8	9	10	11	12
HH member ID Code	Occupation No.	Describe the type of occupation	Work Place Location	Type of contract	Number of days and hours worked per month in this job		Cash Income Earned per month	Does this job include other non-monetary benefits ?	Estimated Value of non-monetary Benefits
		A	B	C	Hours per day	Days per month	(in Rs/month)	D	(in Rs)
	1								
	2								
	3								
	1								
	2								
	3								
	1								
	2								
	3								
	1								
	2								
	3								
	1								
	2								
	3								
	1								
	2								
	3								

Section 7 - Non- farm Self Employment codes

Code A

1 Rice mill owner
2 Silk spinning / weaving Owner
3 Pottery
4 retail Shop Owner
5 Taxi Owner
6 Internet- cafe
7 Hotel/Guest house
8 Restaurant/Bar
9 Hair saloon/barber
10 Repair shop
11 Tailor
12 Internet- cafe
13 Shop space left for rent
14 Mechanik
15 Electrician
16 Plumber
90 Others, specify
97 Don´t know
98 no answer

Code B

1 Sole Proprietorship
2 Private Limited Company
3 Public Limited Company
4 Limited Partnership
5 Partnership
6 Informal/HH-enterprises
90 Others, specify
97 Don´t know
98 no answer
99 not applicable

Code C

1 In the same village
2 in the same sub district
3 In the same district
4 in the same state
5 in other states of India
6 Abroad
97 Don´t know
98 no answer

Code D

1 Yes
2 No
97 Don´t know
98 no answer
99 not applicable

Code E

1 daily
2 weekly
3 monthly
4 3 times a year
5 2 times a year
6 1 times a year
90 Others, specify
97 Don´t know
98 no answer
99 not applicable

Code F

1 Consumer
2 Trader
3 Manufacturer
90 Others, specify
97 Don´t know
98 no answer
99 not applicable

Section 7 - NON FARM SELF - EMPLOYMENT

Please record details between 1st Dec 2009 to 30th Nov 2010

By non-farm self-employment we mean that your are an own-account worker without employees (e.g.: handicraftman, petty-trader, mat-making, ...) or that you are running an own business with family workers or other employees (e.g.: restaurant owner, shop owner, hair salon, taxi/bus owner, rice miller, coffee roasting, ...).

1 Has any of this household's members been engaged in non-farm self-emloyment between Dec 1, 2009 & Nov 30, 2010? [ ] 1. yes [ ] 2. No, go to next sectic

2 How many household members were engaged in non-farm self-employment between Dec 1, 2009 & Nov 30 2010? [ ] person (s)

3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
HH Member ID	No of business	type of business	Starting Year	Initial Investment Amount	Legal form of Organicsation	Place of Business	Does the business have employees (including family members)?	number of employees		Contract Type with employees	Monthly payroll (average per month)	Main type of customers	Location of Customer	Sales Volume (average per month)	Value of in-kind returns, if any	Value of self consumed Production	Costs for input purchases (average per month)	Where do you buy inputs?	Average monthly profit or loss in the given period	No of months engaged in this business in given period
		A	(year)	(in Rs.)	B	C	D (if 2 go to Q15)	Family Members	Non Family	E	(in Rs.)	F	C	(in Rs.)	(in Rs.)	(in Rs.)	(in Rs.)	C	(in Rs.)	(no of months)
	1																			
	2																			
	3																			
	1																			
	2																			
	3																			
	1																			
	2																			
	3																			
	1																			
	2																			
	3																			
	1																			
	2																			
	3																			

Section 8 -Shock Codes

Code A

1 Death or Illness of a HH memb
2 Drought
3 Floods
4 Unusually heavy Rainfall
5 Crop Pests
6 Storage pests (including rats)
7 Livestock diseases
9 Strong decrease in Agricultural output prices
10 Strong increase in Agricultural input prices
90 Others, specify
97 Don´t know
98 no answer

Code B

1 High
2 medium
3 Low
4 No impact
90 Others, specify
97 Don´t know

Code C

1 no other HH
2 some other HH in the village
3 most HH in the village
4 most HH in the sub district
5 most HH in the district
6 most HH in Kerala
7 most HH in India
90 Others, specify
97 Don´t know

Code D

1 Did Nothing
2 Took up additional occupation
3 Diversify agricultural portfolio
4 reduced production inputs
5 Migration
6 Sold Livestock
7 Sold Land
8 Sold other assets
9 Used Savings
10 Used Insurance
11 Borrowed from relatives/friends
12 Borrowed from Govt/Private Banks
13 Borrowed from Pawn shop
14 Received help from Govt
90 Others, specify
97 Don´t know

Code E

1 Yes
2 No
97 Don´t know
98 no answer

Code F

1 less than 1 year
2 1 year
3 More than 1 yr, but now recovered
4 not yet recovered
90 Others, specify
97 Don´t know
98 no answer
99 not applicable

Section 8 - SHOCKS

When considering the past has there been any event causing a big problem (shock) affecting the household?
Please think of any problems related to your family, farm, house or job.

1. Has the household experienced any kind of shocks in the past? ☐ **Yes** ☐ **No** (go to section 8)

a. What were the major shocks that affected your household in the past?

2	3	4	5	6	7	8	9	10	11	12	13	14	15
Event ID	Type of event	When did the event occur	Estimated severity of the event on the household	Estimated loss of income due to the event in the year of occurance?	Estimated loss of asset due to the event?	Aside from your HH, who else was affected by the event?	What was your Coping strategies to deal with the event?			Do the HH still reduce consumption expenditure due to the event?	How much time did it take to recover from the event ?	Do you think any of the events will happen in the next 5 years?	If Q 14 is Yes, then how many times will this event occur?
	A	97, if not known	Code B	(in Rs.)	(in Rs.)	C	(Code D) 1	(Code D) 2	(Code D) 3	E	F	E	
1													
2													
3													
4													
5													
6													
7													
8													
9													
10													

Section 9 - Borrowing Codes

Code A

1 Jewellery
2 Other durable goods
3 Agricultural inputs (fertiliser, pesticide etc)
4 Food
5 cash
90 Others, specify
97 Don´t know

Code B

1 Agriculture related expense
2 Non-Agricultue related business expense
3 pay back other debt
4 House or land purchase/construction
5 Buy durable household goods
6 Improving infrastructure(water supply, sanitation..)
7 buying consumption goods (eg. Food..)
8 Medical treatment
9 Ceremony (wedding, funeral etc)
10 Education
90 Others, specify
97 Don´t know

Code C

1 Governement Bank
2 Private Bank
3 Cooperative Bank
4 Pawn Shop
5 money lender
6 Relatives
7 Friends
8 business partner
90 Others, specify
97 Don´t know

Code D

1 year
2 month
3 week
4 Day

Code E

1 Land
2 use savings to guarantee credit
3 use future crops to guarantee credit
4 house
5 life insurance
6 other asset (eg. Farm equipments, livestock etc)
7 salary/wage
8 no collateral required
90 Others, specify
97 Don´t know

Section 9 - BORROWING

Please record details between 1st Dec 2009 to 30th Nov 2010

1 Does any member of the household have access to borrowing failities ☐ **Yes** ☐ **No**

2 Did you borrow cash or goods fully repaid between Dec 1, 2009 and Nov 30, 2010or not fully repaid yet? ☐ 1. Yes ☐ 2. No, go to next section

Please record all loans that are still owed or loans that have been completely repaid in the period between 1 Dec 2009 and 30 Nov 2010 in decreasing order of value

3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
Loan ID	What is the amount of loan the HH borrowed?(if non cash loan, indicate good and type of value)		For what purpose did you borrow?	Where did you borrow?	What is the duration at the time you took the loan?		Repayment of loan interest							What is the collateral for this loan?	Estimated value of collateral at the
	Type of loan	Value					Type	Principal Payment	Value of interest payment	interest rate	time unit	frequency	in case of lumpsum repayment specify the amount		
	A	(in Rs)	B	C	duration	D	A	(in Rs.)	(in Rs.)	(in %)	D		(in Rs.)	E	(in Rs.)
1															
2															
3															
4															
5															

18 Has the household taken any in kind crop loans between Dec 1, 2009 and Nov 30, 2010 ? ☐ Yes ☐ No(goto Sec 9)

	19	20	21	22	23
Loan	Specify crop against which loan was taken	Amount of loan (in Rs.)	Period of loan (In months)	Qty of crop given as loan repayment bet Dec 1, 2009 & Nov 30, 2010	What price you would get if you sell this quantity in the market? (in Rs.)

Section 10 - SAVINGS

Please record details between 1st Dec 2009 and 30th Nov 2010

We reassure you that all information given is strictly confidential. It will not be given to others and will only serve scientific purposes.

1 How much savings does the household have? [ ] (in Rs.)

2 what is the form of your saving [ ] Code A

3 what are two most important sources of saving between 1Dec 2009 and 30 Nov 2010? 1 [ ] Code B
2. [ ] Code B

4 Do you or your household have any account in the bank or other financial institution? [ ] 1. Yes [ ] 2. No (go to section 10)

5 At what institution do you have saving accounts? [ ] Code C

6 From When do you have this savings account [ ] (DD/MM/YY)

7 Where do you hold this saving ? [ ] Code D

8 What was the amount in this savings account on 30 Nov 2010? [ ] (In Rs.)

9 What was the amount in this savings account on 1 Dec 2009? [ ]

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

Code B
1 profit from Black pepper
2 profit from other crops
3 profit from livestock, fishing etc
4 profit from other business
5 salary/ wages
6 money transfers from relatives or friends
7 public transfers
8 selling land
9 selling other assets
10 inheritence
90 others, specify
97 don't know
98 no answer

Code C
1 Governement Bar
2 Private Bank
3 Cooperative Bank
4 Pawn Shop
5 money lender
6 Relatives
7 Friends
8 business partner
90 Others, specify
97 Don't know
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 state
5 in other states of India
6 Abroad
97 Don't know

Section 11 - PUBLIC TRANSFERS OR OTHER PAYMENTS

Please record details between 1st Dec 2009 and 30th Nov 2010

Interviewer: Read out items of code A

1	2	3	4
HH Member ID	Which public and other payments (including agricultural and other subsidies) did the household receive during the year?		
	Type of Payment	Value	Time Unit
	A	(in Rs)	B

Code A

1 Retirement pensions
2 survivour benefits
3 other Government programs
4 support from religious institutions (church, temple etc)
5 Other payments
6 Subsidy payments received
7 Agricultural training programs
8 Emergency benefits programs
9 Livestock and animal breeding programs
90 Others, specify
97 Don´t know
98 no answer
99 not applicable

Code B

1 Year
2 Month
3 Week
4 Day
90 Others, specify
97 Don´t know
98 no answer
99 not applicable

Section 12- INSURANCE

Please record details between 1st Dec 2009 and 30th Nov 2010

1 Does this household have any insurance? ☐ 1. Yes ☐ 2. No (got to Q 3)

2. If your household members do not have any insurance, why not? ☐ Code A (Goto section 12)

Please list insurance arrangements the household maintains at the moment

3	4	5	6	7	8
HH Member ID	Type of Insurance	Who offers the insurance?	What premium do you pay?		What is the compensation amount, if any received in the given period
			Time Unit	Amount	
	B	C	D	(in Rs.)	(in Rs.)

Code A
1 They do not offer insurance here
2 I do not need insurance
3 Insurance is too expensive
4 There is no adequate insurance for me
90 Others, specify
97 Don´t know
98 no answer
99 not applicable

Code B
1 Life Insurance
2 Health insurance
3 Livestock insurance
4 Crop insurance
90 Others, specify
97 Don´t know
98 no answer
99 not applicable

Code C
1 Government
2 Private
90 Others, spec

Code D
1 Year
2 Month
3 Week
4 Day
90 Others, specify
97 Don´t know
98 no answer
99 not applicable

Section 13 - HOUSEHOLD EXPENDITURE

How much did you spend for the following items in the period 1st Dec 2009 and 30th Nov 2010?

		1	2
	No	Items	Amount per Month
Food	1	Rice	
	2	Vegetable	
	3	fruit	
	4	Cooking oil	
	5	fish	
	6	meat	
	7	chicken	
	8	eggs	
	9	cigarretes	
	10	alcohol	
	11	processed food	
	12	salt and sugar	
	13	beverage (tea, coffee, milk)	
	14	other Food Items	
		Total food	
Non food	15	electricity	
	16	water supply	
	17	liquid gas	
	18	kerosine	
	19	clothes, shoes	
	20	detergen/ washing powder	
	21	personal care supplies	
	22	rental fee	
	23	servant wage	
		Total non food	
transport and comm	24	telecommunication credit	
	25	fuel for car and motorcycle	
	26	public transportation	
	27	maintenance for car and motorbike	
	28	insurance and tax for car and motorbike	
	29	other transportation	
		Total transport and communication	

		1	2
	No	Items	Amount per Month
education	30	tuition fee	
	31	books fee	
	32	rental fee (dormitory etc)	
	33	students dress/ uniform	
	34	pocket money and lunch	
	35	school bus	
	36	other education	
		Total education	
health	37	Medicine	
	38	Doctor fee	
	39	Other health items	
		Total health	
social	40	celebration	
	41	donation	
	42	recreation/ entertaintment	
	43	lottery	
	44	taxes	
	45	others social items	
		total social	
	46	Wheat	
	90	Others, Pls specify	
		Total Expenses	

Section 14 - HOUSEHOLD ASSETS

Please record all assets owned in the period 1 Dec 2009 and 30 Nov 2010

	1	2	3		1	2	3		4	5	6
No	Household Asset	how many items does the HH own?	Value of the item if sold today	No	Household Asset	how many items does the HH own?	Value of the item if sold today	No	Agricultural Asset	how many items does the HH own?	Value of the item if sold today
			(in Rs.)				(in Rs.)				(in Rs.)
1	house			21	electric rice cooker			1	diesel machine		
2	truck			22	sound system			2	tractor		
3	pick up			23	furniture			3	water tank		
4	car			24	sofa set			4	water pump		
5	motorbike			25	jewellery			5	pipe		
6	bike			26	mattress			6	rice mill		
7	TV			27	bed			7	other mills		
8	DVD			28	vacuum cleaner			8	fishing net		
9	refrigerator			29	picture & other art things			9	floating thrawl		
10	tape and radio			30	Others, specify			10	fishing trap		
11	mobile phone			31				11	boat		
12	regular phone			32				12	manual saw		
13	water heater			33				13	chain saw		
14	gas stove			34				14	Others, specify		
15	washing machine			35				15			
16	personal computer			36				16			
17	notebook computer			37				17			
18	electric fun			38				18			
19	iron			39				19			
20	water dispenser				Total				Total		

4. How well-off do you consider your household in comparison to other residents of your village? ____ Code A
5. How well-off do you consider your household in comparison to other residents of your country? ____ Code A
6. How well-off do you consider your household well off in the next 5 years? ____ Code A
7. What do you consider as an absolute minimum net income per month for a household such as yours? ____ (in Rs.)

Code A
1 Much richer
2 Richer
3 the same
4 poorer
5 much poore
90 Oth, specify
97 Don´t know

APPENDIX C: HOUSEHOLD QUESTIONNAIRE 2012

Household Survey Kerala, India
2012

Introductory Statement

We are German university researchers working on a project to study the livelihood systems of Black Pepper farmers in India. We are especially interested in the role of risk in the livelihood of these farmers. To achieve the objective of our research we kindly ask for your cooperation.

We assure you that all information you give during the interview is kept strictly confidential. Data will be used for scientific purposes only and will not be given to any outside person.

Section 1 - SURVEY INFORMATION

0 Questionnaire ID

1 Sub District /Block Name

2 Village Name

3 Type of Household
- ☐ Both Organic & Fair Trade Certified
- ☐ Conventional Farming
- ☐ Only Fair Trade Certified
- ☐ Only Organic Certified

4 Address of the household

5 Name of the Household Head

6 Name of Respondent

7 Name of Interviewer

8 Name of Supervisor

9 Date of Interview(dd/mm/yy)

10 Time Started (hh:mm)

11 Time Finished (hh:mm)

12 Phone No

13 Respondent I.D. Code ☐ (A)

Code A
1 Household Head
2 Wife
3 Son/daughter (incld.adopted)
4 son/ daughter in law
5 Father/Mother
6 Father/Mother in law
7 Sister / Brother
8 Grandchild
9 other relatives
10 non-relatives
97 Don´t know
98 No answer

14 Notes: _____
_____

Section 2 HH Member Codes

Code A

1 Household Head
2 Wife
3 Son/ daughter (incld. adopted)
4 son/ daughter in law
5 Father/Mother
6 Father/ Mother in law
7 Sister / Brother
8 Grandchild
9 other relatives
10 non-relatives
97 Don´t know
98 No answer

Code B

1 Unmaried
2 Married
3 Divorced/ separated
4 Divorced/ separated
98 No answer
99 not applicable

Code C

0 None
1 Primary School (Std 1- 5)
2 Secondary School (Std 6- 10)
3 Higher Secondary School(Std 11-12)
4 Diploma
5 Graduate
6 Master
7 Doctorate

Code D

1 Engaged in own Agriculture
2 Non-farm owned business
3 Agricultural labour working in other farms
4 non-agricultural labor inside district
5 non-agricultural labor outside the district
5 Governement official
6 Housewife
7 Student
8 Child below school age
9 Unemployed
90 Others, pls specify

Code E

1 Scheduled Tribe
2 Scheduled Caste
3 Other Backward caste
4 Forward Caste
90 Others, specify
98 no answer

Code F

1 Hindu
2 Christian
3 Muslim
4 Jews
5 Atheist
90 others, specify

Section 2 - HOUSEHOLD MEMBER DETAILS

Please record details between 1st Dec 2010 and 30th Nov 2011

0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Member ID Code	Name	Relation to family Head	Gender	Age (in Yrs)	Marital status	Education	Occupation I	Occupation II	Average Total Gross Income earned per Year (in Rs.)		Months lived in HH in the given period	No of times, left the HH to work outside	Caste	Religion	Years of farming experience
		A	1= Male, 2= Female	For children < 1 yr put 0	B	C	D	D	Farm Income	Non-Farm Income	(in months)	(number of times)	E	F	(in Yrs)
01															
02															
03															
04															
05															
06															
07															
08															
09															
10															
11															
12															
13															
14															
15															
16															
17															
18															
19															
20															
21															
22															
23															
24															
25															

Section 3 - HOUSING DETAILS

Please record details between 1st Dec 2010 and 30th Nov 2011

1	2	3	4	5	6	7	8	9
Type of housing of the HH	House Owned / Rented (If Ans is 2, then goto Q 3 esle Q4)	If rented, amount per month	Total No of rooms (apart fom Kitchen and Bathroom)	Area	Travel Distance from HH to Bank		Travel Distance from HH to Market	
A	B	(Amt in Rs)		(in acres)	Time (in min)	Distance (km)	Time (min)	Distance (km)

Code A

1 Mud-wall house(kaccha)
2 Mixed mud & stone house
3 Stone House (pakka)
4 Bunglow style
5 two-storey house
6 More than 2 storey house
90 Others, Pls specify
97 don't know
98 no answer

Code B

1 Owned
2 Rented

Section 4 - AGRICULTURE DETAILS

Please record details between 1st Dec 2010 and 30th Nov 2011

1	2	3	4	5
Total Agricultural Area	Owned	Estimated Selling price per acre	Area Owned (in acres)	Irrigated Area Owned (in acres)
	Leased	Rent per acre perYear	Area Leased (in acres)	Irrigated Area Leased (in acres)
	Others, pls specify			

*** If area is less than 0.5 acre and only in cents..then pls specify area in cents**

Continued…..

Section 4 - Agricultural Details Codes

Code A	Code B	Code C	Code D
1 Pepper	1 tonnes	1 Black pepper	1 In the same village
2 Arecanut	2 kilogram	2 Green pepper	2 in the same sub district
3 Coconut	3 pieces	3 White pepper	3 In the same district
4 Cardamom	4 bundle	4 Dried beans	4 in the same state
5 Tea	90 Others, specify	5 Raw	5 in other states of India
6 Coffee	98 no answer	90 Others, pls specify	6 Abroad
7 Rubber	99 not applicable		97 Don´t know
90 Others, specify			

Section 4 - AGRICULTURE DETAILS (Contd..)

Please record details between 1st Dec 2010 and 30th Nov 2011

6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
Crops ID (crops per acre)	Crop Vareity	Area Planted	Planting perriod from…(n case of perinial crops growing longer than 1 year : year of planting)	Harvesting Period.		Total Production	Unit for Quantities	Usage of Production					Sales Price	Product Quality	Where is the market you sell?	Travel Distance to the market from the farm	
								Home consumption (members)	Home Consumption (Livestock)	Household Processing	..in kind payments for labour, machine rental, loan repayments	Sales					
A		(in acres)	Month (or year)	From Month	To Month	Qty	B	Qty	Qty	Qty	Qty	Qty	(in Rs per quantity)	C	D	Time in Minutes	Distance in Km

Section 4 - Agricultural Details Codes

Code A	Code E
1 Pepper	1 Owned
2 Arecanut	2 rented
3 Coconut	3 Borrowed (no fee paid)
4 Cardamom	90 Others, specify
5 Tea	97 Don´t know
6 Coffee	98 no answer
7 Rubber	99 not applicable
90 Others, specify	

Section 4 - AGRICULTURE DETAILS (Contd..)

Please record details between 1st Dec 2010 and 30th Nov 2011

6	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41
Crops ID (crops per acre)	Expenditures for land preparation for this crop							Expenditures for seeds,seedlings & planting						Expenditures for hand weeding				
	Machine used is…	Variable machine cost	Labour Expenses					Seeds and Seedlings	Hired labor including food, drinks									
			Family Labor	No of days	Hired Labor	No of days	Wage per day		Family Labor	No of days	Hired Labor	No of days	Wage per day	Family Labor	No of days	Hired Labor	No of days	Wage per day
A	E	(in Rs.)	(no of people)		(no of people)		(in Rs)	(in Rs.)	(no of people)		(no of people)		(in Rs)	(no of people)		(no of people)		(in Rs)

Section 4 - Agricultural Details Codes

Code A	Code B	Code C
1 Pepper	1 Before Planting	1 more than 6 months before harvest
2 Arecanut	2 During Planting	2 2 to 6 months before harvest
3 Coconut	3 After Planting	3 1 month before harvest
4 Cardamom	90 Others, Pls specify	90 Others, specify
5 Tea		
6 Coffee		
7 Rubber		
90 Others, specify		

Section 4 - AGRICULTURE DETAILS (Contd..)

Please record details between 1st Dec 2010 and 30th Nov 2011

6	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59
Crops ID (crops per acre)	Expenditures for Manure Management									Expenditures for fertiliser application								
	Materials				Hired labor including food, drinks					Materials				Hired labor including food, drinks				
	Name	Qty used	Cost per Qty	Time of Application	Family Labor	No of days	Hired Labor	No of days	Wage per day	Name	Qty used	Cost per Qty	Time of Application	Family Labor	No of days	Hired Labor	No of days	Wage per day
A		(in kg)	(in Rs)	Code B	(no of people)		(no of people)		(in Rs)		(in kg)	(in Rs)	Code C	(no of people)		(no of people)		(in Rs)

Section 4 - Agricultural Details Codes

Code A	Code B	Code C
1 Pepper	1 Before Planting	1 more than 6 months before harvest
2 Arecanut	2 During Planting	2 2 to 6 months before harvest
3 Coconut	3 After Planting	3 1 month before harvest
4 Cardamom	90 Others, Pls specify	90 Others, specify
5 Tea		
6 Coffee		
7 Rubber		
90 Others, specify		

Section 4 - **AGRICULTURE DETAILS** (Contd..)

Please record details between 1st Dec 2010 and 30th Nov 2011

6	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77
Crops ID (crops per acre)	Expenditures for Insecticides									Expenditures for Fungicides								
	Materials				Hired labor including food, drinks					Materials				Hired labor including food, drinks				
	Name	Qty used	Cost per Qty	Time of Application	Family Labor	No of days	Hired Labor	No of days	Wage per day	Name	Qty used	Cost per Qty	Time of Application	Family Labor	No of days	Hired Labor	No of days	Wage per day
A		(in kg)	(in Rs)	Code C	(no of people)		(no of people)		(in Rs)		(in kg)	(in Rs)	Code C	(no of people)		(no of people)		(in Rs)

Section 4 - Agricultural Details Codes

Code A	
1	Pepper
2	Arecanut
3	Coconut
4	Cardamom
5	Tea
6	Coffee
7	Rubber
90	Others, specify

Code C	
1	more than 6 months before harvest
2	2 to 6 months before harvest
3	1 month before harvest
90	Others, specify

Section 4 - AGRICULTURE DETAILS (Contd..)

Please record details between 1st Dec 2010 and 30th Nov 2011

6	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93
Crops ID (crops per acre)	Expenditures for Herbicides									Expenditures for Harvest (including Threshing, if required)						Irrigation Expenses
	Materials				Hired labor including food, drinks					Machinery cost	Labour Expenses					
	Name	Qty used	Cost per Qty	Time of Application	Family Labor	No of days	Hired Labor	No of days	Wage per day		Family Labor	No of days	Hired Labor	No of days	Wage per day	
A		(in kg)	(in Rs)	Code C	(no of people)		(no of people)		(in Rs)		(no of people)		(no of people)		(in Rs)	(in Rs.)

Section 4 - Agricultural Details Codes

Code A		Code D	
1	Pepper	1	Yes
2	Arecanut	2	No
3	Coconut		
4	Cardamom		
5	Tea		
6	Coffee		
7	Rubber		
90	Others, specify		

Section 4 - AGRICULTURE DETAILS (Contd..)

Please record details between 1st Dec 2010 and 30th Nov 2011

6	94	95	96
Crops ID (crops per acre)	Do you store the crop?	How much stored as of today (date of interview)	Please estimate its current value if you had to sell it
A	D	Qty	(in Rs.)

Section 4.1 - LIVESTOCK & AQUACULTURE

Please record details between 1stDec 2010 and 30th Nov 2011

1 Did you produce livestock product between 1 Dec 2010 and 30 Nov 2011? ☐ 1. Yes ☐ 2. No, go to Section 4.2

Now, please list and quantify livestock products produced between 1 Dec 2010 and 30 Nov 2011

	2	3	4	5	6	7	8	9	10
No ID	Livestock product	Number of Livestock	Value per livestock if sold today	total production	home consumption	Quantity Sold	Estimated Sales Value / Quantity	Package costs	Storage Costs
			(in Rs)	(individual unit)	(individual unit)	(individual unit)	(in Rs.)	(in Rs.)	(in Rs.)
1	Milk								
2	Cow								
3	Buffalo								
4	Pigs								
5	Chicken								
6	Duck								
7	Goat								
8	Milk given to other animals in the household								
9	Rabbits								
90	others, specify								

Section 4.2 - FISHING, HUNTING, COLLECTING, LOGGING

Please record details between 1st Dec 2010 to 30th Nov 2011

1 Is your household involved in fishing, hunting, collecting (firewood)or logging?

	1. Yes
	2. No, go to section 5

	2	3	4	5	6	7	8	9	10	11	12
No ID	Type of activity	Access Fee	Total Expense	What is th normal season for this activity		Type of produce extracted	total Output (in the given period)	Specify unit	Home consumption	Qty sold in the market	Estimated selling prie
	A	(in Rs.)	(in Rs.)	From Month	To Month	(eg. Shrimp, honey etc)	(individual unit)	C	(in unit specified in Q 8)	(in unit specified in Q 8)	(in Rs.)
1											
2											
3											
4											
5											

Code A

1 fishing
2 hunting / catching
3 collecting
4 logging
5 Others, pls specify

Code C

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

Section 5 - Organic & Fair trade details

Code A
1. Conventional Farming
2. Only Organic certified
3. Only Fair Trade certified
4. Both organic and Fair Trade certifie

Code B
0 No support received
1 Training
2 Financial support
3 Oranising Organic seeds
4 Support during organic conversion period
5 Marketing support
6 Certification help
7 Technology support
90 Others. Pls specify

Code C
0. No support received
1. Free technology training
2. Subsidised electricity charges
3. Payment for labour above certain number
4. Extra subsidy if organic farming is undertaken
90. Others, please specify

Code D
1. Improvement in standard of living
2. Increase in Income
3. Atleast a minimum price is assured in Fair trade
4. Soil improvement
5. Increase in productivity
6. Better yields
7. Environment friendly
8. Low input costs
9. Protection against pests and diseases
90. Others, pls specify

Code E
1. Lack of Labour
2. High Labour costs
3. Soil deterioration
4. pest and diseases
5. high cost of external farm inputs
6. Human Health problems due to pest
7. Organic certification costs
8. Fair trade certification costs
9. Loss of yield during organic conversion
10. Low Output prices
11. Not aware of fir trade
90. Others, Pls specify

Code F
1 Will further expand the area
2 Will reduce the area
3 Will retain the same area
4 Apart from farming will venture into non-farm business
5 Will come out of farming

Code G
0 No future plans
1 Diversification into new crops
2 Diversification into new product markets without any relation to former activities
3 Diversification into farm processsinh
4 Diversification into Direct marketing
5 crop specialisatoin
6 Livestock specialisation
7 Mixed farming
90 others, pls specify

Section 5 - ORGANIC & FAIR TRADE DETAILS OF THE HOUSEHOLD

1	2	3	4	5	6	7
Farming Practice of the HH	From When	Type of support received from Local NGO	Type of support received from Govt. Extension agencies		Benefits received	Problems Faced
			In Kind support	Cash subsidy support		
Code A	(Year)	Code B	Code C	(in Rs per year)	Code D	Code E
			1)		1)	1)
			2)		2)	2)
			3)		3)	3)

8	9	10
What are your future prospects?	How much will you invest in future to develop your farm?	What are your future farming operation plans?
Code F	(in Rs. Per acre) (0 if no investment)	Code G

OFT Codes

Code A
1- Yes
2. No
97. Don´t know
98.No Answer

Code B
1 Their soil has deteriorated, want to improve
2 Due to health concerns
3 Do to environmental concerns
4 Higher output price
5 Low input cost
6 Organic better controls pests & diseases
7 Better export opportunity
8 Community support
9 Friends and family support
10 Governemnt support
90 Others, pls specify

Code C
1. High labour costs
2. Lack of labour supply
3. High organic certification costs
4. Low yields during conversion
5. Lack of domestic demand
6. Lower yields compared to conventional
7. Lack of government support
8. Lack of community support
9- Lack of friends and family support
90. Others, pls specify

Code D
1.Not aware of Fair trade
2. High Fair trade certification costs
3. Not interested in export
4. Membership difficult in existing cooperatives or farmer association bodies
5. Difficult to start a cooperative or farmer association bodies
6. Difficult to maintain a cooperative or farmer association bodies
7. Difficulty in meeting with fair trade Labour standards
8. Lack of community support
9. Lack of Government support
10. Competitive output prices available in local markets
11. Lack of friends and family support
90. Others, pls specify

Code E
1. Minimum fair price assured
2. Improves standard of living
3. Lack of domestic demand
4. Want to export
5. Promotes Gender Equity
6. Develpos producer independence
7. Better Labour working conditions
8. Support available from NGOs
9. Support available from Government
10. Transparent suppy chains
11. Friends and family support
12. Community supoor
90. Others, pls specify

For conventional farming practicing Households only

11	12	13	14	15	16
Will you adopt certified organic farming in future?	If Q8, is yes, reasons	If Q8, is no, reasons	Will you market through Fair Trade in future?	If Q11, is yes, reasons	If Q11, is no, reasons
Code A	Code B	Code C	Code A	Code E	Code D
	1)	1)		1)	1)
	2)	2)		2)	2)
	3)	3)		3)	3)

For Only Organic certified Households

17	18	19	20	21	22	23	24	25
When did you decide to adopt organic cultivation?	From When did you start selling as certified organic?	Reasons for adopting organic	Will you continue to be organic certified in Future?	If No, reasons	Are you aware of Fair Trade (if yes, go to next Question 23, If no go to Q 35)	Will you adopt Fair Trade in future?	If Q11, is yes, reasons	If Q11, is no, reasons
Year	Year	Code B	Code A	Code C	Code A	Code A	Code E	Code D
		1)		1)			1)	1)
		2)		2)			2)	2)
		3)		3)			3)	3)

OFT Codes

Code A
1- Yes
2. No
97. Don´t know
98.No Answer

Code B
1 Their soil has deteriorated, want to improve
2 Due to health concerns
3 Do to environmental concerns
4 Higher output price
5 Low input cost
6 Organic better controls pests & diseases
7 Better export opportunity
8 Community support
9 Friends and family support
10 Governemnt support
90 Others, pls specify

Code C
1. High labour costs
2. Lack of labour supply
3. High organic certification costs
4. Low yields during conversion
5. Lack of domestic demand
6. Lower yields compared to conventional
7. Lack of government support
8. Lack of community support
9- Lack of friends and family support
90. Others, pls specify

Code D
1.Not aware of Fair trade
2. High Fair trade certification costs
3. Not interested in export
4. Membership difficult in existing cooperatives or farmer association bodies
5. Difficult to start a cooperative or farmer association bodies
6. Difficult to maintain a cooperative or farmer association bodies
7. Difficulty in meeting with fair trade Labour standards
8. Lack of community support
9. Lack of Government support
10. Competitive output prices available in local markets
11. Lack of friends and family support
90. Others, pls specify

Code E
1. Minimum fair price assured
2. Improves standard of living
3. Lack of domestic demand
4. Want to export
5. Promotes Gender Equity
6. Develpos producer independence
7. Better Labour working conditions
8. Support available from NGOs
9. Support available from Government
10. Transparent suppy chains
11. Friends and family support
12. Community supoor
90. Others, pls specify

For Both Organic and Fair Trade certified Households only

26	27	28	29	30	31	32	33	34
When did you decide to adopt organic cultivation?	From When did you start selling as certified organic?	Reasons for adopting organic	When did you decide to market through Fair Trade?	From When did you start selling through fair trade	Reasons for marketing through fair trade	Will you continue to be both organic & Fair trade certified in Future?	If No, reasons	List 3 benefits of organic cutivation apart from income & consumption
Year	Year	Code B	Year	Year	Code E	Code A	Code C & D	(open-ended Q)
		1)			1)		1)	1)
		2)			2)		2)	2)
		3)			3)		3)	3)

How do you access the following attributes of farming system? Please rank each attribute between 1 (very low) to 5 (very high)

		35	36	37	38
	How do you access the attributes of the following farming systems. (Please rank 1 to 5 for each attribute)	Conventional Farming	Organic farming	Fair Trade marketing	Organic farming under fair trade marketing
1	Profit				
2	Income				
2	Effect on Standard of Living				
3	Food Safety				
4	Environmental Impact				
5	Soil Fertility				
6	Certification process (cost)				
7	Market access				
8	Governement Support				
9	NGO support				
10	Risk factor				
90	Others, pls specify				

Section 6 - Off -Farm Employment Codes

Code A

1 Agricultural Wage Laborer for others
2 Logger for others
3 fisher for others
4 Factory worker
5 Construction worker
6 Government worker
7 Cook
8 Tailor
9 Vendor
10 Driver
11 cleaner / Housemaid
12 Carpenter
13 Mechanic
14 Electrician
15 Plumer
16 Rice Mill Owner
90 Others, specify
97 Don´t know
98 no answer

Code B

1 In the same village
2 in the same sub district
3 In the same district
4 in the same state
5 in other states of India
6 Abroad
97 Don´t know
98 no answer

Code C

1 Unlimited
2 Limited
3 Day to Day
4 verbal agreement/no contract
90 Others, specify
97 Don´t know
98 no answer
99 not applicable

Code D

1 Yes
2 No
97 Don´t know
98 no answer

Code E

1 accomodation
2 food
3 transport
4 insurance
90 Others, specify
97 Don´t know
98 no answer

Section 6 - OFF FARM EMPLOYMENT

Please record details between 1st Dec 2010 to 30th Nov 2011

By off-farm employment we refer to all activities not related to agricultural production on your own farm.
First, we ask you about the wage-employed activities, for example: agricultural worker on other farms, factory worker, construction worker, service worker ...).

1. **Has anyone of your household members worked as a wage-emloyee between 1st Dec 2010 & 30th Nov 2011?** ☐ 1. Yes ☐ 2. No, go to next Section

2. **How many members of your household have worked as a wage-employee between 1st Dec 2010 & 30th Nov 2011?** ☐ person (s)

3	4	5	6	7	8	9	10	11	12
HH member ID Code	Occupation No.	Describe the type of occupation	Work Place Location	Type of contract	Number of days and hours worked per month in this job		Cash Income Earned per month	Does this job include other non-monetary benefits ?	Estimated Value of non-monetary Benefits
		A	B	C	Hours per day	Days per month	(in Rs/month)	D	(in Rs)
	1								
	2								
	3								
	1								
	2								
	3								
	1								
	2								
	3								
	1								
	2								
	3								
	1								
	2								
	3								
	1								
	2								
	3								

Section 7 - Non- farm Self Employment codes

Code A

1 Rice mill owner
2 Silk spinning / weaving Owner
3 Pottery
4 retail Shop Owner
5 Taxi Owner
6 Internet- cafe
7 Hotel/Guest house
8 Restaurant/Bar
9 Hair saloon/barber
10 Repair shop
11 Tailor
12 Internet- cafe
13 Shop space left for rent
14 Mechanik
15 Electrician
16 Plumber
90 Others, specify
97 Don´t know
98 no answer

Code B

1 Sole Proprietorship
2 Private Limited Company
3 Public Limited Company
4 Limited Partnership
5 Partnership
6 Informal/HH-enterprises
90 Others, specify
97 Don´t know
98 no answer
99 not applicable

Code C

1 In the same village
2 in the same sub district
3 In the same district
4 in the same state
5 in other states of India
6 Abroad
97 Don´t know
98 no answer

Code D

1 Yes
2 No
97 Don´t know
98 no answer
99 not applicable

Code E

1 daily
2 weekly
3 monthly
4 3 times a year
5 2 times a year
6 1 times a year
90 Others, specify
97 Don´t know
98 no answer
99 not applicable

Code F

1 Consumer
2 Trader
3 Manufacturer
90 Others, specify
97 Don´t know
98 no answer
99 not applicable

Section 7 - NON FARM SELF - EMPLOYMENT

Please record details between 1st Dec 2010 to 30th Nov 2011

By non-farm self-employment we mean that your are an own-account worker without employees (e.g.: handicraftman, petty-trader, mat-making, ...) or that you are running an own business with family workers or other employees (e.g.: restaurant owner, shop owner, hair salon, taxi/bus owner, rice miller, coffee roasting, ...).

1 Has any of this household's members been engaged in non-farm self-emloyment between Dec 1, 2010 & Nov 30, 2011? [ ] 1. yes [ ] 2. No, go to next section

2 How many household members were engaged in non-farm self-employment between Dec 1, 2010 & Nov 30 2011? [ ] person (s)

3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
HH Member ID	No of business	type of business	Starting Year	Initial Investment Amount	Legal form of Organisation	Place of Business	Does the business have employees (including family members)?	number of employees		Contract Type with employees	Monthly payroll (average per month)	Main type of customers	Location of Customer	Sales Volume (average per month)	Value of in-kind returns, if any	Value of self consumed Production	Costs for input purchases (average per month)	Where do you buy inputs?	Average monthly profit or loss in the given period	No of months engaged in this business in given period
		A	(year)	(in Rs.)	B	C	D (if 2 go to Q15)	Family Members	Non Family	E	(in Rs.)	F	C	(in Rs.)	(in Rs.)	(in Rs.)	(in Rs.)	C	(in Rs.)	(no of months)
	1																			
	2																			
	3																			
	1																			
	2																			
	3																			
	1																			
	2																			
	3																			
	1																			
	2																			
	3																			
	1																			
	2																			
	3																			

Section 8 -Shock Codes

Code A

1 Death or Illness of a HH memb
2 Drought
3 Floods
4 Unusually heavy Rainfall
5 Crop Pests
6 Storage pests (including rats)
7 Livestock diseases
9 Strong decrease in Agricultural output prices
10 Strong increase in Agricultural input prices
90 Others, specify
97 Don´t know
98 no answer

Code B

1 High
2 medium
3 Low
4 No impact
90 Others, specify
97 Don´t know

Code C

1 no other HH
2 some other HH in the village
3 most HH in the village
4 most HH in the sub district
5 most HH in the district
6 most HH in Kerala
7 most HH in India
90 Others, specify
97 Don´t know

Code D

1 Did Nothing
2 Took up additional occupation
3 Diversify agricultural portfolio
4 reduced production inputs
5 Migration
6 Sold Livestock
7 Sold Land
8 Sold other assets
9 Used Savings
10 Used Insurance
11 Borrowed from relatives/friends
12 Borrowed from Govt/Private Banks
13 Borrowed from Pawn shop
14 Received help from Govt
90 Others, specify
97 Don´t know

Code E

1 Yes
2 No
97 Don´t know
98 no answer

Code F

1 less than 1 year
2 1 year
3 More than 1 yr, but now recovered
4 not yet recovered
90 Others, specify
97 Don´t know
98 no answer
99 not applicable

Section 8 - SHOCKS

When considering the past has there been any event causing a big problem (shock) affecting the household?
Please think of any problems related to your family, farm, house or job.

1. Has the household experienced any kind of shocks in the past? ☐ Yes ☐ No (go to section 8)

a. What were the major shocks that affected your household in the past?

2	3	4	5	6	7	8	9	10	11	12	13	14	15
Event ID	Type of event	When did the event occur	Estimated severity of the event on the household	Estimated loss of income due to the event in the year of occurance?	Estimated loss of asset due to the event?	Aside from your HH, who else was affected by the event?	What was your Coping strategies to deal with the event?			Do the HH still reduce consumption expenditure due to the event?	How much time did it take to recover from the event ?	Do you think any of the events will happen in the next 5 years?	If Q 14 is Yes, then how many times will this event occur?
	A	97, if not known	Code B	(in Rs.)	(in Rs.)	C	(Code D) 1	(Code D) 2	(Code D) 3	E	F	E	
1													
2													
3													
4													
5													
6													
7													
8													
9													
10													

Section 8.1 - Risk codes

Code A

1 Yes
2 No
97 Do not know
98 No Answer

Code B

1 1 in 5 years
2 2 in 5 years
3 3 in 5 years
4 4 in 5 years
5 5 in 5 years
90 Others, specify
97 Do not know
98 No Answer
99 Not applicable

Code C

1 High
2 Moderate
3 Low
4 No Impact
90 Others, specify
97 Do not know
98 No Answer
99 Not applicable

Code D

1 Nothing

Saving and Investment

2 Saving with Self help groups (microfinance)
3 Saving account in the commercial bank
4 Savings in Governement banks
5 Saving in gold

6 **Income source**

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

Borrowings and Savings

10 use savings
11 use insurance
12 Borrow from relatives
13 Borrow from friends / neighbours
14 Borrow from governemnt banks
15 Borrow from private banks
16 Borrow from pawn shop and other non-financial institution

Gants

17 help from Governement
18 help from NGO
19 Help from relatives
20 Help from friends / neighbours
90 Others, specify
97 Do not know
98 No Answer
99 Not applicable

Section 8.1 - Risks

	1	2	3	4	5	6	7	8	9
	Event No	Type of event	Do you think …will happen in the next 5 years? (If no, go to Q 5)	How often, do you think it will occur in the next 5 years?	if ..occurs in the next 12 months, estimate impact on your income	if ..occurs in the next 12 month, estimate impact on your asset	Will 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 Q7 is NO)	Concerning…approximately how much does it cost you per year to prevent/ mitigate? (incl for gone income) (do not ask if Q7 no)
			A	B	C	C	A	D	(in Rupees)
General	1	illness of HH Head / Member							
	2	accident of HH Head / Member							
	3	birth or person joined the HH							
	4	Expensive Ceremony							
	5	house damage							
	6	theft in home							
	7	Relatives/Friends stopped sending money (remittances)							
	8	Conflict with other people							
Agriculture	9	flood							
	10	drought							
	11	Unusual heavy rainfall							
	12	crop pests							
	13	Storage pests (including rats)							
	14	Livestock Disease							
	15	Landslide, Erosion							
	16	Failure of irrigation water							
	17	Diminishing Crop yield							
Other economic shocks	18	job loss in agriculture							
	19	job loss in non agriculture							
	20	Collapse of business							
	21	Unable to pay back loan							
	22	Strong increase of interest rate on loans							
	23	Strong decrease of prices for Output							
	24	Strong increase of prices for Input							
	90	Other risks, specify							

8.2 Risk Perception

1. Are you generally a person who takes risks or are you a person who generally avoids risks?
Please state the same in a scale of 1 to 10 (1 no risk and 10 very high risk taker)
Enumerator - Circle the number chosen by the interviewee

Section 9 - Borrowing Codes

Code A

1 Jewellery
2 Other durable goods
3 Agricultural inputs (fertiliser, pesticide etc)
4 Food
5 cash
90 Others, specify
97 Don´t know

Code B

1 Agriculture related expense
2 Non-Agricultue related business expense
3 pay back other debt
4 House or land purchase/construction
5 Buy durable household goods
6 Improving infrastructure(water supply, sanitation..)
7 buying consumption goods (eg. Food..)
8 Medical treatment
9 Ceremony (wedding, funeral etc)
10 Education
90 Others, specify
97 Don´t know

Code C

1 Governement Bank
2 Private Bank
3 Cooperative Bank
4 Pawn Shop
5 money lender
6 Relatives
7 Friends
8 business partner
90 Others, specify
97 Don´t know

Code D

1 year
2 month
3 week
4 Day

Code E

1 Land
2 use savings to guarantee credit
3 use future crops to guarantee credit
4 house
5 life insurance
6 other asset (eg. Farm equipments, livestock etc)
7 salary/wage
8 no collateral required
90 Others, specify
97 Don´t know

Section 9 - BORROWING

Please record details between 1st Dec 2010 to 30th Nov 2011

1 Does any member of the household have access to borrowing failities ☐ Yes ☐ No

2 Did you borrow cash or goods fully repaid between Dec 1, 2010 and Nov 30, 2011 or not fully repaid yet? ☐ 1. Yes ☐ 2. No, go to next section

Please record all loans that are still owed or loans that have been completely repaid in the period between 1 Dec 2009 and 30 Nov 2010 in decreasing order of value

3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Loan ID	What is the amount of loan the HH borrowed?(if non cash loan, indicate good and		For what purpose did you borrow?	When did you borrow	Where did you borrow?	What is the duration at the time you took the loan?		Repayment of loan interest							What is the balance that still needs to be paid (including principal +interest)?	What is the collateral for this loan?	Estimated value of collateral at the time you got the loan
	Type of loan	Value						Type	Principal Payment	Value of interest payment	interest rate	time unit	frequency	in case of lumpsum repayment specify the amount			
	A	(in Rs)	B	Year	C	duration	D	A	(in Rs.)	(in Rs.)	(in %)	D		(in Rs.)	(in RS)	E	(in Rs.)
1																	
2																	
3																	
4																	
5																	

21 **Has the household taken any in kind crop loans between Dec 1, 2010 and Nov 30, 2011 ?** ☐ Yes ☐ No(goto Sec 9)

	22	23	24	25	26
Loan	Specify crop against which loan was taken	Amount of loan (in Rs.)	Period of loan (In months)	Qty of crop given as loan repayment bet Dec 1, 2009 & Nov 30, 2010	What price you would get if you sell this quantity in the market? (in Rs.)

Section 10 - SAVINGS

Please record details between 1st Dec 2010 and 30th Nov 2011

We reassure you that all information given is strictly confidential. It will not be given to others and will only serve scientific purposes.

1 How much savings does the household have? [ ] (in Rs.)

2 what is the form of your saving [ ] Code A

3 what are two most important sources of saving between 1Dec 2009 and 30 Nov 2010? 1 [ ] Code B
2. [ ] Code B

4 Do you or your household have any account in the bank or other financial institution? [ ] 1. Yes [ ] 2. No (go to section 10)

5 At what institution do you have saving accounts? [ ] Code C

6 From When do you have this savings account [ ] (DD/MM/YY)

7 Where do you hold this saving ? [ ] Code D

8 What was the amount in this savings account on 30 Nov 2010? [ ] (In Rs.)

9 What was the amount in this savings account on 1 Dec 2009? [ ]

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

Code B
1 profit from Black pepper
2 profit from other crops
3 profit from livestock, fishing etc
4 profit from other business
5 salary/ wages
6 money transfers from relatives or friends
7 public transfers
8 selling land
9 selling other assets
10 inheritence
90 others, specify
97 don't know
98 no answer

Code C
1 Governement Ban
2 Private Bank
3 Cooperative Bank
4 Pawn Shop
5 money lender
6 Relatives
7 Friends
8 business partner
90 Others, specify
97 Don´t know
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 state
5 in other states of India
6 Abroad
97 Don´t know

Section 11 - PUBLIC TRANSFERS OR OTHER PAYMENTS

Please record details between 1st Dec 2010 and 30th Nov 2011

Interviewer: Read out items of code A

1	2	3	4
HH Member ID	Which public and other payments (including agricultural and other subsidies) did the household receive during the year?		
	Type of Payment	Value	Time Unit
	A	(in Rs)	B

Code A

1 Retirement pensions
2 survivour benefits
3 other Government programs
4 support from religious institutions (church, temple etc)
5 Other payments
6 Subsidy payments received
7 Agricultural training programs
8 Emergency benefits programs
9 Livestock and animal breeding programs
90 Others, specify
97 Don´t know
98 no answer
99 not applicable

Code B

1 Year
2 Month
3 Week
4 Day
90 Others, specify
97 Don´t know
98 no answer
99 not applicable

Section 12- INSURANCE

Please record details between 1st Dec 2010 and 30th Nov 2011

1 Does this household have any insurance? ☐ 1. Yes ☐ 2. No (got to Q 3)

2. If your household members do not have any insurance, why not? ☐ Code A (Goto section 12)

Please list insurance arrangements the household maintains at the moment

3	4	5		6	7	8
HH Member ID	Type of Insurance	Who offers the insurance?	Total Amount (Face Value) of Insurance	What premium do you pay?		What is the compensation amount, if any received in the given period
				Time Unit	Amount	
	B	C		D	(in Rs.)	(in Rs.)

Code A
1 They do not offer insurance here
2 I do not need insurance
3 Insurance is too expensive
4 There is no adequate insurance for me
90 Others, specify
97 Don´t know
98 no answer
99 not applicable

Code B
1 Life Insurance
2 Health insurance
3 Livestock insurance
4 Crop insurance
90 Others, specify
97 Don´t know
98 no answer
99 not applicable

Code C
1 Government
2 Private
90 Others, spec

Code D
1 Year
2 Month
3 Week
4 Day
90 Others, specify
97 Don´t know
98 no answer
99 not applicable

Section 13 - HOUSEHOLD EXPENDITURE

How much did you spend for the following items in the period 1st Dec 2010 and 30th Nov 2011?
(please not these are items purchased and not produced by the household themselves)

		1	2
	No	Items	Amount per Month
Food	1	Rice	
	2	Vegetable	
	3	fruit	
	4	Cooking oil	
	5	fish	
	6	meat	
	7	chicken	
	8	eggs	
	9	cigarretes	
	10	alcohol	
	11	processed food	
	12	salt and sugar	
	13	beverage (tea, coffee, milk)	
	14	other Food Items	
		Total food	
Non food	15	electricity	
	16	water supply	
	17	liquid gas	
	18	kerosine	
	19	clothes, shoes	
	20	detergen/ washing powder	
	21	personal care supplies	
	22	rental fee	
	23	servant wage	
		Total non food	
transport and comm	24	telecommunication credit	
	25	fuel for car and motorcycle	
	26	public transportation	
	27	maintenance for car and motorbike	
	28	insurance and tax for car and motorbike	
	29	other transportation	
		Total transport and communication	

		1	2
	No	Items	Amount per Month
education	30	tuition fee	
	31	books fee	
	32	rental fee (dormitory etc)	
	33	students dress/ uniform	
	34	pocket money and lunch	
	35	school bus	
	36	other education	
		Total education	
health	37	Medicine	
	38	Doctor fee	
	39	Other health items	
		Total health	
social	40	celebration	
	41	donation	
	42	recreation/ entertaintment	
	43	lottery	
	44	taxes	
	45	others social items	
		total social	
	46	Wheat	
	90	Others, Pls specify	
		Total Expenses	

Section 14 - HOUSEHOLD ASSETS

Please record all assets owned in the period 1 Dec 2010 and 30 Nov 2011

	1	2	3	4		1	2	3	4		4	5	6	4
No	Household Asset	how many items does the HH own?	Value of the item if sold today	Price When Purchased	No	Household Asset	how many items does the HH own?	Value of the item if sold today	Price When Purchased	No	Agricultural Asset	how many items does the HH own?	Value of the item if sold today	Price When Purchased
			(in Rs.)	(in Rs.)				(in Rs.)	(in Rs.)				(in Rs.)	(in Rs.)
1	house				21	electric rice cooker				1	diesel machine			
2	truck				22	sound system				2	tractor			
3	pick up				23	furniture				3	water tank			
4	car				24	sofa set				4	water pump			
5	motorbike				25	jewellery				5	pipe			
6	bike				26	mattress				6	rice mill			
7	TV				27	bed				7	other mills			
8	DVD				28	vacuum cleaner				8	fishing net			
9	refrigerator				29	picture & other art things				9	floating thrawl			
10	tape and radio				30	Others, specify				10	fishing trap			
11	mobile phone				31					11	boat			
12	regular phone				32					12	manual saw			
13	water heater				33					13	chain saw			
14	gas stove				34					14	Others, specify			
15	washing machine				35					15				
16	personal computer				36					16				
17	notebook computer				37					17				
18	electric fan				38					18				
19	iron				39					19				
20	water dispenser					Total					Total			

5. How do you consider your household in comparison to other residents of your village?	Code A	**Code A**
6. How do you consider your household in comparison to other residents of your country?	Code A	1 Much Better
7. How do you consider your household in comparison to last year?	Code A	2 Better
8. How do you consider your household now in comaprison to the last 5 years?	Code A	3 the same
9. How do you consider your household in the next 5 years?	Code A	4 Worse
10. What do you consider as an absolute minimum net income per month for a household such as yours?	(in Rs.)	5 Much Worse
		90 Oths, specify
		97 Don´t know