The Impact of Customary Inter-Household Transfers on Labour-led Cash Crop Intensification among the Smallholder Farmers of Malekula Island, Vanuatu

by

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I certify that this work contains no material which has been accepted for the award of any other degree or diploma in any university or other tertiary institution and, to the best of my knowledge and belief, contains no material previously published or written by another person, except where due reference has been made in the text. In addition, I certify that no part of this work will, in the future, be used in a submission for any other degree or diploma in any university or other tertiary institution without the prior approval of the University of Adelaide and where applicable, any partner institution responsible for the joint-award of this degree.

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Abstract

Smallholder farming households in the Small Island Development State (SIDS) of Vanuatu have been observed to withhold family labour from cash crop production in order to contribute to participate in inter-household transfers of resources presided over by local elites, despite rising demand for income. Research throughout the Pacific suggests that inter-household transfers are principally motivated by differences in household social capital and the payment of tribute to high status households. Contributing labour to these transfers restricts the adoption of smallholder cash-crop intensification, complicating development program efforts to increase rural household incomes.

This study investigates the benefits of cash-crop intensification (CCI) to cocoa growing smallholders on Malekula Island, in the north of the Vanuatu archipelago. The research presents an empirical investigation analyzing how the relationship between inter-household transfers and the adoption of labour intensive cocoa production methods, with the objective of informing the design of more effective rural development interventions in SIDS.

The specific objectives of the study are to analyze: (1) the factors affecting the assignment of household labour to inter-household transfers; (2) the factors affecting the assignment of group or village labour to private households; (3) the impact of the assignment of group or village labour on household labour supply responses to on and off-farm production activities; and (4) the implications of the supply of household

labour to village or group labour activities, for labour-led CCI among remote rural communities in SIDS.

This study provides empirical evidence from a survey of 530 households. The analysis demonstrates that private households supply labour to village labour activities to both obtain public good benefits and as well as improve their access to shared land and labour resources in the future. The research identifies that households which are assigned village labour tend to possess higher levels of asset and social capital endowments. Households assigned village labour, tend to reallocate family labour to off-farm activities offering higher returns to their efforts. Rather than help address deficits in the supply of labour to support cash crop production at times of peak demand, smallholder households transfer labour to elite households in order to strengthen these strategic relationships and improve future access to farm inputs (land and labour). Elite households gain additional utility by using inputs of village labour to substitute on-farm family labour, releasing it to engage in off-farm employment and deliver higher income levels.

This study determines that smallholder households in the study group are not sufficiently incentivised to increase their supply of labour inputs to cash crop intensification, preferring to shift surplus labour into off-farm employment and inter-household exchanges due to the higher returns to labour and potential long-run economic rewards offered by those activities. Subsequently, this study concludes that labour-led cash crop intensification programs are not the most effective method for increasing smallholder household incomes; and that national authorities and technical

agencies should prioritise interventions which reduce cash crop marketing costs, facilitate improved access to income generating opportunities in off-farm employment and reduce demand for household labour from village authorities for public good production.

Contents

List of Tables and Figures

List of Acronyms

AusAID	Australian Aid Program
ACIAR	Australian Centre for International Agricultural Research
ANOVA	Analysis of Variance
BIBD	Balanced Incomplete Block Design
BIC	Bayesian Information Criterion
BW	Best Worst
CCI	Cash Crop Intensification
CDP	Vanuatu Cocoa Development Plan (2010-14)
CE	Central Area Council, Malekula
DARD	Department for Agricultural Research and Development, Vanuatu
ENSO	El Nino Oscillation System
FAO	Food and Agriculture Organisation
GDP	Gross Domestic Product
HSD	Honesty Significance Difference
ILO	International Labour Organisation
IMF	International Monetary Fund
IMR	Inverse Mills Ratio
IPDM	Integrated Pest and Disease Management
LC	Latent Cluster
LL	Log Likelihood
MANOVA	Multivariate Analysis of Variance

NE	North East Area Council, Malekula
NW	North West Area Council, Malekula
OLS	Ordinary Least Square
PARDI	Pacific Agribusiness Research and Development Initiative
PIC	Pacific Island Country
PWB	Public Works Bureau, Vanuatu
SE	South East Area Council, Malekula
SIDS	Small Island Development State
SIS	Standard Interval Scale
SO	South Area Council, Malekula
SQRT	Square Root
SW	South West Area Council, Malekula
VCE	Variance Component Estimator
VNSO	Vanuatu National Statistics Office

1. Introduction

This study examines the factors influencing smallholder engagement with modern cash crop markets in the Small Island Development State of Vanuatu, in the South Pacific. It identifies, and investigates empirically, how inter-household transfers of labour and consumption goods influence labour supply responses among rural agricultural households. The study examines the impact of inter-household transfers on small-holder engagement with cocoa export markets on the northern Vanuatu island of Malekula. It investigates the impact of this factor in order to answer the research question: why have Malekula's smallholders not responded to cocoa market price signals by adopting cocoa cash crop intensification strategies?

This chapter provides the conceptual framework for the investigation of this research question, identifying current gaps in the literature regarding the impact of inter-household labour transfers on rural household utility outcomes, and outlines the methodologies employed in this study to make a significant, new contribution to this literature.

1.1 Background to the study

The international development community has long recognized the obstacles to improving smallholder engagement with cash crop markets (Bass and Dalal-Clayton 1995; Collier 2009; Connell 2010). Semi-subsistence farmers in Small Island Development States (SIDS) face a number of special geographic, economic and

environmental factors which limit their incentives to invest additional land and labour resources in cash crop production, which include: (i) poorly developed road transport infrastructure and large distances between islands and export markets, increasing the cost of cash crop marketing; (ii) low population densities, constraining or preventing economies of scale; and (iii) vulnerability to frequent and intense natural disasters, principally cyclones (Abbott and Pollard 2004; Bass and Dalal-Clayton 1995; Carlston and Boucher 1999; Collier 2009; Connell 2010; Connell and Lea 2002; Feeney and Rogers 2008; Hein 2004; Josling 2003; McGillivray et al. 2008).

Cash crop production in the Pacific Islands is notable for the low rates of investment in productivity enhancing capital inputs (e.g., fertilizers, pesticides, farm machinery and high-yielding seed varieties), with farmers compensating for low rates of yield by adopting 'extensification' rather than 'intensification' strategies. These strategies involve the establishment of larger areas of land planted under cash crops plantings - often in multiple locations – and the investment of few labour inputs into crop management and harvesting (Curry et al 2009; McGregor 2002; Weightman 1989; Welegtabit and Longmore 2006), often resulting in high rates of 'under-harvesting' and high incidence of pests and diseases.

Subsistence food crop production follows a similar pattern, compensating for low rates of yield per area by establishing 'itinerant' food gardens in fresh soil every year, thereby maintaining soil fertility and returns to effort (Weightman 1989; Welegtabit and Longmore 2006). The relatively high rate of return to family farm labour generated by this strategy results in a "subsistence affluence" (Fisk 1971; Stent

and Webb 1975) which has traditionally reduced the incentive to allocate additional capital and labour to cash cropping strategies among Pacific Island smallholders. This strategy is, of course, dependent upon the maintenance of low population densities. Rising population pressures in the Pacific Islands – particularly among the Melanesian countries, such as Vanuatu - have begun to limit the capacity of rural households to continue to extend the size of their landholding as an alternative to more (land, labour and capital) intensive forms of agriculture (AusAID 2008; Lightfoot and Ryan 2001; Ratuva 2005; Singh 2011). This has led Pacific Island Countries (PICs) to look to improve rural livelihoods by encouraging the adoption of cash crop intensification strategies.

Cash crop intensification (CCI) programs usually aim to encourage households to increase their rate of supply of agricultural inputs – either capital or labour (Reardon et al. 1994; 1999). Capital-led intensification approaches - which rely on farm machinery, pesticides, fertilizers and/or high-yield seed - depend on the availability and affordability of these inputs for the targeted households; as well as acess to bank credit with which to purchase capital items; and the support of agricultural extension advisors to train households on the efficient and effective use of the new inputs (Barrett and Carter 2001; Clay and Reardon 1997; Reardon and Vosti 1992; Rusike et al. 1997; Viyas 1983). Labour-led CCI requires farmers to apply additional units of labour to a given unit of land, enabling them to crop more densely, harvest more intensely or adopt more complete crop management techniques (Reardon et al. 1999). The adoption of labour-led CCI depends on either the availability of a surplus supply of labour

(household or non-household), or the transfer of such labour from competing activities to cash cropping**.**

However, smallholder households in PICs face competing demands for their labour time which may limit their capacity to adopt more labour-intensive cash crop production and processing. Anthropologists and economists investigating the constraints upon smallholder household cash cropping in PICs have found that the cultural obligation to allocate labour to inter-household transfers (food, cash and labour time) is a key factor in smallholder household labour supply decisions (Cox et al. 1990; Evans 2001; Huffman 2005; Gregory 1982; Macfarlane 1994; McGregor and Hopa 2007; O'Meara 1990; Rio, 2007; Sahlins 1963; 1972; Welegtabit and Longmore 2006). Understanding the full range of benefits offered by the inter-household transfers is therefore critical to predicting household labour supply response to cash crop intrnsification programs in PICs. To date, these benefits have not been established in empirical research.

Household models are often employed by economists to investigate how semi-subsistence smallholders make decisions regarding the allocation of household labour to competing activities, such as subsistence and cash crop production. These models are based on the assumption that households act to maximize utility by allocating labour to those activities offering the highest marginal returns (Becker 1965; Heckman 1976; Singh et al. 1986; Taylor and Alderman 2003).

Household models have identified that failing labour markets tend to dampen the supply of labour towards CCI production strategies if the household faces a relative

labour shortage (Taylor et al. 2003). Economists have similarly identified that failing labour markets encourage smallholder communities to adopt alternative mechanisms for facilitating transfers of labour from surplus to deficit households, such as labour exchanges (Coate and Ravillion 1993; Key et al. 2000).

Participation in labour exchanges is usually found to be motivated by reciprocation (of an equal amount of labour in the future) rather than payment (Moore 1975; Suehara 2006). However differences in relative endowments of social capital have also been described as influencing flows of inter-household transfers of resources, including labour, in smallholder communities (Beteille 1983; Coleman 2000; Dasgupta 2005; Glaeser et al. 2002).

Smallholders in the PICs and Vanuatu have been observed to allocate significant labour and land resources to meeting social obligations to participate in inter-household transfers (Blackwood 1981; McGregor and Hopa 2008; Rio 2007; Rodman 1995; Weightman 1989). However significant debate remains as to whether these transfers result in marginal utility gains by increasing the supply of labour and resources to households with lower endowments (Huffman 2005) or operate without regard to marginal utility (McGregor and Hopa 2007). The impact of these transfers on the supply of labour to cash crop production, and the prospects of labour-led CCI, are therefore unknown.

In order to gain an insight into the social and cultural motivations which are also important for understanding household utility, it is necessary to complement household models with a method of estimating smallholder choices. Best Worst scaling

experiments enable empirical researchers to gain an insight into the factors which motivate household labour supply decisions (Cohen, 2009; Marley and Louviere, 2005; Umberger et al. 2015). Whilst traditionally used to examine marketing decisions, Best Worst scaling experiments use a robust method of predicting real household choices. By combining a household labour supply model with a Best Worst model, this study can establish empirically which factors exert the greatest influence on these smallholder labour-supply decisions (Donnelan and Hennessy 2012; Woolridge 2002).

1.2 Objectives of the study

In 2009, the Government of Vanuatu asked the Australian Centre for International Agricultural Research (ACIAR) to assist them to implement the Vanuatu Cocoa Development Progam (2010-14) by helping them to understand the factors influencing household cash crop labour supply decisions. The Vanuatu Cocoa Development Plan (CDP) aimed to assist rural smallholders to shift towards new methods of producing, processing and marketing cocoa (ACIAR 2009). The Vanuatu CDP largely focused on increasing production through the adoption of more labour-intensive planting, crop management and processing methods, designed to both improve yields and assist households to access higher priced niche export markets (DARD 2009). This Program aimed to encourage smallholders, through the intervention of field training programs, to invest additional household labour in cocoa production and processing.

ACIAR had significant experience of implementing cocoa CCI programs in PICs; and further, in partnership with the Secretariat for the Pacific Community (SPC) and the University of Adelaide, had developed a tested methodology for analyzing and understanding smallholder incentive structures. In order to adapt this methodology to the rural Vanuatu context, the study team had to develop an understanding of the operation of rural labour markets in Vanuatu, as well as the relative returns to labour of competing agricultural and non-agricultural income generating activities.

This process led to the study team to examine what were the most and least important factors motivating smallholders to invest scarce labour resources in inter-household transfers. Subsequently, the study team assessed the impact of the assignment of exogenous inputs of 'village' labour on smallholders' rate of supply of labour to cash crop production, or other on and off-farm production activities. Through this approach, this study was able to establishes both the motivation to engage in inter-household transfers and and their impact on CCI strategies.

As a result, this study makes an important contribution to the literature by providing empirical evidence of the impact of a new factor (inter-household transfers) on smallholder household labour supply decisions in Small Island Development States. Moreover, it utilizes a unique methodology for identifying the most important smallholder incentives for supplying labour to inter-household transfers: Best Worst scaling.

1.3 Vanuatu and Malekula: one size does not fit all

The Republic of Vanuatu is an archipelago nation of 80 islands of rugged mountains, high plateaus, coastal plains and offshore coral reefs, spread across 1,300 km of ocean, 3000km to the North East of Australia (VNSO 2007). More than 75% of Vanuatu's population of 247,000 lives in rural areas (VNSO 2009), where engagement in farm production is the major source of employment (ILO 2009). The average per capita income was US$3182 in 2012 (239,685 Vatu), placing the country 128th in the world for per capita income (World Bank 2012). Food is the most important household expenditure item among rural households, representing 56% of total household expenditure, with the majority of the value of this expenditure being on the consumption of own produced food (VNSO 2013).

Agriculture in Vanuatu is constantly threatened by natural disaster, with Vanuatu suffering the third highest annual economic loss (as a percentage of GDP) to natural disasters, of any nation (World Bank 2012).

To maintain an itinerant food crop farming system, Vanuatu smallholders focus on producing annual food gardens centred around the production of root crops (yams and coco-yams) less easily damaged by high-speed wind and heavy rain associated with cyclonic weather. The food garden is supplemented by income from the sale of two major cash crops: copra and cocoa (McGregor and Hopa 2007; Weightman 1989). Though this system affords some additional protection from the risk of natural disasters, it has been identified that the establishment and travel time costs associated with annual 'itinerant' food cropping contributes to smallholder households achieving lower rate of

returns to labour than under more intensive food and cash crop production systems (Weightman 1989). In addition, rising population levels are beginning to reduce the efficacy of this farming system (AusAID 2007; VNSO 2009).

Low levels of ownership of labour saving farm assets, poor access to improved planting materials and yield enhancing inputs - combined with an ageing stock of cocoa and copra trees - ensure Vanuatu's smallholder producers achieve consistently poor yields, and income, from cash crop production (McGregor and Hopa 2007; VNSO 2007; Weightman 1989).

Malekula is the third largest island of the Vanuatu archipelago, and consists of 120,000 hectares of tropical forest, mountains and coastal plains dotted with small plots of coconut palms and cocoa trees (VNSO 2007; VNSO 2009). Like rural households elsewhere in Vanuatu, Malekula's 4950 households depend on family labour and land owned by the tribal group (McGregor 2002; VNSO 2009; VNSO 2010) to derive an income largely provided by subsistence food production (VNSO 2013).

The coverage of road infrastructure on the Island is not extensive and the existing network is often rendered unusable in the rainy season; and therefore farmers face a relatively expensive and unreliable connection to the major cash market in Lakatoro, in Malekula's North East (ADB 2010; AusAID 2011); and eventually, to the nation's port for export, at Luganville on the neighbouring island of Espiritu Santos. These additional transaction costs reduce the returns to cash crop labour, and similarly dampen the economic incentives to increase the supply of labour to CCI.

At the same time, rising off-farm income levels amongst rural households indicate that demand for off-farm wages is further eroding smallholder preferences to supply of labour to cash crop production (VNSO 2006; 2010).

As elsewhere in Vanuatu, inter-household transfers also reduce the amount of family labour available for cash crop production on Malekula. Housedholds have been observed to dedicate a significant proportion of their productive time to producing gifts of food, crafts and labour centred around a range of village and *kastom* activities (Feintree et al. 2010; Huffman 2005; McGregor and Hopa 2007; Welegtabit and Longmore 2006).

Households have been described as motivated to supply labour to these inter-household transfers by various social and economic benefits including: improved social status (Huffman 2005; 2008) and privileged access to scarce farm inputs such as land (Rodman and Ward 1995; Tacconi 1997). Other benefits could include greater income security as a result of improved access to consumption goods and credit in times of financial stress (de Janvry et al. 1991). Smallholders may also derive public goods from well-maintained village infrastructure and effective enforcement mechanisms for settling disputes and maintaining law and order, which result from transfers of household resources to 'village activities' (Malvatumauri 2013).

The private and public, social and economic benefits offered by village activities have yet to be established through empirical research. In addition, the impacts of these inter-household transfers on smallholder labour allocation decisions, is similarly unknown. This needs to be estabioished empirically before national policy-makers and

development partners will be able to accurately predict household labour-supply responses to cocoa CCI.

1.4 The research problem

Researchers investigating the factors influencing smallholder household labour supply decisions in rural Vanuatu disagree as to whether customary inter-household transfers increase (Huffman 2005) or decrease (McGregor and Hopa 2007) smallholder incentives to supply labour to agricultural production. They also disagree on whether these transfers are motivated to increase the marginal utility of the rural community by redirecting resources from surplus to deficit households (Huffamn 2005), or to improve the social relations with elites in the community in order to obtain long-run social and economic benefits (Gregory 1983) as has been identified elsewhere in Melanesia.

Improving our understanding of how inter-household transfers impact on the labour-supply decisions of smallholders, is critical to assisting to designing policies program interventions more effective at supporting rural development in PICs. This study investigates the impact that inter-household transfers of labour impact on the incentives for smallholders on Malekula, Vanuatu, to adopt labour-led CCI production strategies.

This study aims to investigate the impact of inter-household transfers on household utility by examining: (i) whether smallholder households on Malekula respond to increased returns to cash-crop labour by increasing their inputs of household labour to CCI production strategies; (ii) which social and economic benefits are most

important for motivating households to supply labour to inter-household transfers; and (iii) what impact the assignment of exogenous inputs of labour have on household labour supply responses to on and off-farm production activities. An important objective of this study is to understand what impact inter-household transfers have on the incentives smallholders face to adopt labour-led CCI; and whether this strategy for increasing rural household incomes will be effective in Vanuatu, and in other SIDS where inter-household transfers are a common amongst rural farming communities.

Ultimately, this research acts to inform the development of policies and programs that capitalize on the prevailing cultural framework in the rural communities of Melanesia, and contribute to the development of more effective policies to support improved livelihood outcomes amongst rural households in these areas.

1.5 The research questions

The study addresses the following principal research question:

Are CCI strategies an effective strategy for assisting rural smallholders to improve their livelihoods?

In order to answer this general research question, a series of subsidiary research questions are addressed:

1. Do households respond to increased returns to cocoa labour by adopting cocoa CCI strategies?
2. What social and economic benefits are most important factors in explaining why households supply labour to inter-household transfers?

3. Can distinct clusters or sub-populations be identified to distinguish how and why households supply labour to inter-household transfers?
4. What household endowment factors are significantly correlated with the receipt of assignments of supplementary labour?
5. What is the impact of the assignment of supplementary labour on household labour supply responses to both on and off-farm income generating activities?

This study discusses the implications of the findings uncovered by investigating these research questions for CCI on Malekula, as well as for other remote smallholder farming communities in SIDS.

1.7 Methodological Approach

To obtain the level of socio-cultural and economic understanding it was necessary to develop a survey instrument capable of accurately measuring such a potentially diverse set of household benefits. The development of the questionnaire was preceded by a lengthy period of preparation, conducted in the following four phases:

Phase 1 - Semi-structured interviews with key stakeholders and review of relevant economic and anthropological literature: to determine research questions, discover and gain insight into previous work and issues that need to be considered in designing survey instruments.

Phase 2 - Development of initial data collection instruments: a household labour diary (distributed to 50 households), and a cocoa production and labour input record (72 households).

Phase 3 - Based on the Phase 1 literature review and data generated during Phase 2, a household survey instrument and Best-Worst scaling experiment were designed and pre-tested on 480 households.

Phase 4 - A final survey instrument was revised based on the pre-test, and responses collected from 530 households, thus providing a representative geographical sample of Malekula Island.

The first phase of study preparations was spent engaging in semi-structured interviews with key informants familiar with Vanuatu's rural sector and reviewing the relevant agricultural economics and anthropology literature, in order to identify the key factors influencing the adoption of labour-intensive CCI strategies by Malekula's smallholders. This was followed by semi-structured interviews with lead farmers from Malekula's cocoa marketing co-operatives in order to identify other potential key factors or contextual information which would be integral to understanding the motivations behind the household labour allocation strategies documented in in the literature, and gathered through previous interviews.

The second phase was to develop two data collection instruments in order to gather initial data on household labour supply decisions. These two instruments were implemented in 2011 and 2012: (i) a labour supply 'diary' used to record the daily farming and non-farming activities of 50 head of households over two, one month long

study periods (the July ‘harvest’ and November ‘off-season’ of 2011); and (ii) a cocoa production ‘record’ which collected the total labour inputs, and cocoa production outputs, of 72 head of households in 10 farming communities over a one-year trial of cocoa crop management techniques, from March 2011 to March 2012.

The data gathered as a result of the implementation of these two survey instruments provided initial insights into specific research questions on labour supply strategies employed by a group of cocoa-growing semi-subsistence smallholders on Malekula, including the approximate proportion of family labour allocated to food crops, cash crops and contributed to inter-household transfers.

The information collected through these two survey instruments helped to inform the development of the pilot household questionnaire, which was designed in April and May 2012 and pre-tested among 480 households in the North and Central part of Malekula in June and July 2012. The large number of households selected for pre-testing was in order to ensure that the final survey instrument addressed issues faced by different cultural or geographic groups, and therefore accommodated potential heterogeneity in the eventual sample population.

After the results of the pre-test were entered and analysed in late July, a final version of the questionnaire was developed in August 2012. This questionnaire was designed to collect detailed quantitative information on the range of household factors identified in the literature and through key informant interviews. The questionnaire also included modules designed to capture quantitative information on the households’ supply of labour to various on and off-farm activities - including to group labour

activities dedicated to the maintenance of local infrastructure and the supply of supplementary labour inputs to selected private households, under the direction of local elites - in order to enable the development of a household model.

In total, 530 households from Malekula were randomly selected to ensure a representative sample from each geographic District (North East, North West, Central South, South East and South West). Between September 2012 and March 2013, 530 heads of households were surveyed by the enumeration team. The collected data was entered between March and May of 2013, and analysed using Stata 10 and Latent Gold 4.3.

1.7 Original contribution to research and implications for policy

This study makes a significant contribution to the literature about smallholder household labour supply decisions in SIDS. *First*, this study represents an empirical analysis of more than 500 smallholder households. It is one of the few household behavioural studies of households, based on face-to-face interviews, conducted anywhere in PICs over the past two decades. *Second*, this study develops and tests a detailed, culturally-sensitive methodology to examine the underlying assumptions of development programs and policies introduced to assist semi-subsistence households in the Pacific island. *Third*, the data analysis documents and interprets the importance of social capital and status in the calculus of household decision making in Vanuatu, and possibly elsewhere in PICs. *Fourth*, the analysis demonstrates that the adoption of

labour-led CCI production strategies across PICs, specifically in the case of cocoa, requires the provision of additional incentives and program adjustments.

Through this process, this study identifies a unique, new factor influencing smallholder labour supply responses: inter-household transfers. In addition, it describes the utility offered by inter-household transfers among smallholders facing failing labour and land markets, such as in Malekula. It identifies that village or group labour activities do have an important impact on smallholder production strategies by using a unique methodology for identifying the most important factors: Best Worst (BW) scaling.

BW scaling has been used to understand farmer marketing decisions (Umberger et al., 2015). This is the first known example of using this methodology to measure farmer labour supply decisions. Through this method we investigate whether households are motivated to supply labour to inter-household transfers by the prospect of 'like reciprocation' or by the prospect of accessing other social and economic benefits.

1.8 Thesis outline

This thesis is organized into nine chapters.

Chapter 2 presents empirical evidence of the factors affecting smallholder production and identifies the methodologies used for modelling the labour-supply responses of semi-subsistence households. It investigates the household demographic and environmental factors affecting small-holder participation in markets, and their

common labour supply responses. It reviews the literature regarding the special development challenges facing smallholders in SIDS. It presents evidence of the institutional responses of smallholders in PICs, to some of these special development challenges, and the impact on their supply of labour to cash crop production. The chapter subsequently reviews the theoretical literature on the use of household utility models for predicting semi-subsistence farmer labour supply responses. Finally it explores the use of choice modelling and BW scaling experiments to gain an insight into the variance in the stated motivations underpinning household labour supply responses, and how this can be used to broaden our understanding of the utility households derive from participation in inter-household transfers.

Chapter 3 provides a detailed description of the geographic, social and economic factors affecting cash crop production, food crop production and other economic activities, among the small-holders of Vanuatu, and Malekula. It presents evidence of the trends in cash crop production, food crop production, participation in cultural activities and household income generation in order provide an outline of the household utility strategies pursued by smallholders in Vanuatu.

Chapter 4 presents the methodology used to investigate the key research questions proposed in this study, and the key descriptors of the sample population. The chapter outlines the preparatory steps leading to the identification and development of the study's data collection instruments. It describes the data collection methods, and the challenges faced throughout this process.

Chapter 5 presents the key descriptive findings on the sample population initially revealed by the household questionnaire. This chapter provides summary statistics for the main household variables identified in the literature as having an important potential impact on smallholder household labour supply responses. These results are interpreted in order to discover the key characteristics of the sample, prior to further empirical analysis.

Chapter 6 investigates the subsidiary research question: 'do households in the sample population increase their supply of family labour to cash crop production in response to increased returns to cash crop labour?' It employs the case study method to provide an overview of the key descriptive data on household labour supply trends among Malekula's cocoa growing smallholders, as generated by the preliminary survey tools. This chapter provides an overview of the impact and adoption of a cash crop intensification method that offers high yields and returns to labour – cocoa Integrated Pest and Disease Management – by Malekula smallholders participating in a 12-month trial. Subsequently, it discusses the implications of these results for labour-led CCI.

Chapter 7 investigates two key subsidiary research questions: i) what social and economic benefits are the most important factors motivating households to supply labour to inter-household transfers; and, ii) can distinct clusters or sub-populations be identified to distinguish how and why households supply labour to inter-household transfers? The chapter uses a BW scaling experiment to identify the reciprocal social and economic benefits providing the principal motivation for households to invest family labour in a range of community activities. It calculates the individual utility

scores for explanatory factors, and identifies the factors most important to motivating households to supply labour to inter-household transfers. Latent Gold 4.3 is used to investigate the latent relationships between household responses, and presents evidence of distinct clusters of households within the sample set. This chapter also presents evidence of the relationship between the mean characteristics of households in each cluster, and the principal social and economic factors motivating their labour supply behaviour. It concludes with a discussion of these results, and the implications for the impact of CCI on household utility.

Chapter 8 investigates two key subsidiary research questions: what household endowment factors are significantly correlated with the assignment of supplementary labour by village authorities; and what is the impact of the assignment of supplementary labour on the supply of family labour to cash crop production, and other on and off-farm activities? The chapter investigates the impact of the assignment of labour on household labour supply responses. It uses an Inverse Mills Ratio (IMR) following the method established by Heckman (1976), in order to calculate of the impact of the assignment of village labour on the household labour supply responses of households with both a positive and negative value for the dependent variable. It uses a robust variance component estimation (VCE) method developed by White (1980) to reduce error variance associated with heteroskedasticity resulting from conditional expectations such as those imposed by positive and negative values of the dependent variable. This two-step method enables an investigation of the impact of the assignment of village labour on households' rate of supply of labour to cash crop production, food crop

production, participation in inter-household transfers and participation in off-farm income earning opportunities. In addition, it uses a Probit regression to investigate the significant characteristics of households who are assigned supplementary labour by village authorities. This method enables the study to effectively identify whether the assignment of labour effectively supplements or is a substitute for family farm labour, in order to release it for other non-farm activities. Subsequently, the chapter discusses the implications of these results for the relative incentives smallholder households on Malekula face to engage in labour-led CCI, or other activities.

Chapter 9 discusses the implications of these results for project interventions which encourage labour-led CCI in Malekula, and the appropriate policies and projects for improving rural livelihoods among the farming communities of Vanuatu, and PICs. It presents a number of ancillary policies which might also encourage cocoa CCI in Vanuatu; as well as other opportunities for increasing rural incomes. It identifies a numer of areas for future research, and summarises the original contribution made by this study, to the literature.

2. Factors affecting smallholder labour supply responses

2.1 Introduction

The chapter provides an overview of the economics and anthropology literature relevant to understanding smallholder household labour supply decisions in developing and emerging economies, particularly in the Pacific Islands. The chapter commences with a review of the economics literature to identify the household factors relevant to understanding the potential constraints upon smallholder engagement with modern markets, including: 1) the size of their landholding and the tenure system under which they operate their farm; 2) the number of the members of the household, their age and education level; 3) their access to financial inputs and assets such as bank loans, remittances, and non-farm sources of income; 4) their access to external productivity enhancing inputs such as farm machinery and tools; and 5) their distance from market, the quality of local transport infrastructure and therefore the cost of marketing cash crops; 6) whether or not they were members of institutions which could reduce marketing costs, such as farmer organisations; 7) the rate of exposure to risks of natural disaster and other exogenous shocks to cash crop production and prices; 8) the impact of failing, shallow or 'missing' input and output markets have on smallholder household labour supply responses; and 9) and the impact that inter-household transfers may have on either increasing or decreasing the volume of household inputs invested in agricultural production.

Understanding why households contribute to, and benefit from, inter-household transfers will be critical to understanding utility, and predicting household labour-supply responses amongst the smallholders of Malekula Island, Vanuatu. The chapter describes inter-household transfers and identifies that they are motivated by differential endowments of social capital, rather than reciprocation. The chapter presents evidence from the PIC anthropology literature describing inter-household transfers as operating to assist households to accumulate social capital, and access the long-run social and economic benefits provided by high levels of social capital.

2.2 Factors affecting smallholder supply of labour to cash crop production

In the wider economics literature, smallholder farmers are presumed to act to maximize utility by allocating family labour to a range of activities competing for their time: food crop production, cash crop production, leisure, social capital building, non-farm income generation and the production of a range of goods and services for own consumption and exchange (Sadoulet and deJanvry 1995). Smallholder decisions to allocate family labour among these competing activities are thought to be heavily influenced by considerations of the relative returns to labour provided by each, taking into account the level of risk introduced by market failure and exogenous shocks such as natural disasters (Binswanger 1980; von Braun and Pandya-Lorch 1991; Reardon, et al. 1992).

The literature suggests that smallholders regularly withhold family labour from cash crop production to continue subsistence food production when faced with shallow markets (due to limited or abundant supply of a particular good) and high transactions costs (due to poor marketing infrastructure, and high search and supervision costs), and high rates of risk of crop failure, affecting the rate of adoption of cash crop intensification strategies (de Janvry et al. 1991; Duflo 2003; Morduch 1993; Rosenzweig and Binswanger 1993; Sadoulet and de Janvry 1995; Singh and Strauss 1986; Walker and Jodha 1986).

Smallholder farming communities respond to missing or shallow markets by developing alternate institutions for facilitating transfers of needed resources between households, such as food, cash and labour (Coate and Ravillion 1993; Fafchamps 1992; 2008; Key et a;. 2000). These transfers are identified to be principally motivated by reciprocation, with strong enforcement mechanisms - such as permanent exclusion from the network or limiting membership to households with close genetic, familial and economic ties, helping to ensure households do not 'cheat' by failing to reciprocate support (Fafchamps 1992; Posner 1980). These inter-household transfers are therefore identified as promoting an efficient allocation of resources in remote communities and result, in an increase in the rate of labour supplied to cash crop production.

The rate of household labour supplied to cash crop production has also been found to be affected by heterogeneity in household resource endowments, such as land, labour, capital inputs (labour saving machinery, improved planting material) and bank credit; as well as by differences in the age of family members, education and training

levels; and remittance levels (de Janvry et al. *2*006; Dyer et al. *2*001; Ellis 1992; Eswaran and Kotwal 1986; Feder 1985; Sadoulet et al. 1998).

Some economists assume that the undersupply of labour to cash crop production among semi-subsistence producers is a consequence of a high preference for leisure, coupled with limited wants (Barzel and McDonald 1973; Berg 1961; Ellis 1981). Others conclude that low rates of participation in cash crop production may be a result not of high demand for leisure, but demand for the production of goods and services not provided by the market (Hymer and Resnick 1969). Demand for household labour from productive activities such as family maintenance (cooking, fetching wood and water, tending the house, pregnancies, rearing the children, attending the elders); the provision of public goods (mending of public building, bridges and fences, settling disputes); the manufacture of cultural artifacts (weaving of mats, production of handicrafts); and community engagement activities (relationships within the kin networks and with neighbours and the community, festivals, religious practices) reduce the amount of household labour available to cash crop production activities (Ellis 1993).

The size of a household's labour endowment, relative to their land endowment, has been found to be an important factor influencing labour supply responses to cash crop production, among smallholder producers (Benjamin 1992). In agricultural societies marked by universal access to land, access to agricultural labour can be relatively scarce, particularly at times of peak demand, i.e. at harvest (Fafchamps 1992; Ellis 1981).

Barnum and Squire (1979), in their model of household labour supply decision-making under conditions of constrained utility maximization, identify that households are either net buyers or sellers of labour, depending on their relative land and labour endowments. Households with a high ratio of labour to land endowment would be expected to maximize the returns to labour by 'hiring' out labour to other households; while households with a low ratio of labour to land, would expect to be net buyers of labour. Factor endowments and the ratio between land and labour, and the returns provided to labour, matter in household welfare maximization. Households that have relatively equal endowments of land, as well as having equally high relative endowments of land to family labour, are unlikely to have a surplus of labour with which to supply the market.

According to the Barnum-Squire (1979) model, such circumstances result in higher wages, perhaps even wages that surpass the marginal returns to market labour - given search and supervision costs. Under such conditions, rural labour markets would fail to assist smallholders to supplement family labour at times of peak demand.

Smallholders dependent on family labour face seasonal labour shortages at times of peak labour demand (such as when harvesting their food crops) which reduces their ability to access a consistent, year round supply of labour sufficient to develop successful supply relationships with cash crop markets (Byerlee and Hesse de Polanco 1983; Hopkins and Berry 1994). The relatively high cost of non-family labour, encourages the development of alternative mechanisms for improving household access

to supplementary labour, such as village labour exchanges (Chibnik and de Jong 1990; Otsukaa et al. 2001).

These exchanges have been identified as providing higher marginal returns to labour, and increased cash crop production (de Janvry and Sadoulet 2001; de Janvry and Sadoulet 2006; Dyer et al. 2001; Ellis 1993). Netting (1993) found that labour supplied through traditional labour exchange mechanisms amongst indigenous farming communities in South America, increased the proportion of labour supplied to cash cropping by as much as 50%; while Geschiere (1995) found that a reduction in the operation of labour exchange mechanisms in rural Cameroon resulted in reduced cocoa production. Gilligan (2004) found that the scale returns to effort provided by 'group work' achieved through labour exchanges is a significant factor in explaining the incentive for households to use labour exchanges.

However inter-household exchanges of labour have been identified to be motivated by other factors, such as differences in social status – with households with higher levels of social status obtaining net benefits from exchanges with lower status households (Beteille 1983; Dasgupta 2005; Gouldner 1960). Under such conditions households may be motivated to invest scarce labour resources out of social obligation, or in order to accumulate social status, resulting in reduced – rather than increased – investment of labour in agricultural production activities, and in reduced welfare outcomes for the community (Berry 1989; LeFavre and Thomas 2012). Thus inter-household labour transfer systems may reduce the capacity of smallholder households to adopt more labour intensive cash crop production strategies.

Barrett (1993) finds that households in Madagascar with small farm size withhold labour from cash crop production because they are price risk averse. Feder (1985) theorises a positive relationship exists between size of landholding and yield, given the improved ability of farmers with larger landholdings to secure credit to purchase productivity-enhancing inputs. By contrast, in Pakistan, Heltberg (1998) found an inverse relationship between the size of landholding and yield where landholdings were worked by family labour with poor access to labour saving technology. Likewise, Binswanger and Rosenzweig (1986) indicate that smallholder households in land scarce environments with surplus labour redirect their efforts back to subsistence farm production, where they are unable to find sufficient off-farm work.

Productivity-enhancing inputs - such as farm machinery, fertilizers, pesticides and improved planting stock - can release household labour or land from subsistence food production by increasing the marginal returns to labour, and enable it to be redirected in favour of cash crop production or off-farm work, and obtain higher household incomes (Bravo-Ortega and Lederman 2005; Hayami and Ruttan 1971). However the role of the non-agriculture sector, including the retail and the public sectors, is critical to improving access to such inputs among agricultural producers (Hayami and Ruttan 1971; Myrdal 1970). Barriers to the provision of technological inputs are responsible for the largest differences in agricultural labour productivity across developed and developing countries (Restuccia et al. 2008). Facilitating further investment by the private sector in the provision of affordable and accessible inputs would therefore increase the productivity of cash crop labour and incomes in the

developing world, and enable diversification into other income generating activities (Kelly et al. 2003).

Agricultural extension services facilitate the adoption of productivity-enhancing inputs and methods, and motivate households to supply additional labour to cash crop production. Given that the adoption of labour-saving inputs is also dependent on farmers' efficient utilization of these inputs, training producers to effectively utilize non-traditional agricultural inputs is necessary (if not sufficient) to facilitate behavioural change (Birkhauser et al. 1991). However Huffman (1980) finds that such training also increases smallholder off-farm employment opportunities by increasing the efficiency of farm labour, potentially freeing up surplus labour to move into the off-farm sector and reducing the rate of supply to cash crop production. Despite evidence that agricultural research and extension has a significant positive impact on the productivity of farmers, governments in developing countries often have a limited financial capacity to deliver these services to smallholders (Fan et al. 1999). Alternatives to centrally directed models of extension service delivery, for example, through local private trainers and farm co-operatives, can help to reduce the cost and increase the efficiency of such services (Anderson and Feder 2004).

The education level of smallholders is another important factor influencing the rate of supply of labour to cash crop production. An increase in the level of education of the head of the farm household can increase the productivity of farm labour by improving their rate of adoption of new labour productivity enhancing technologies, and result in increased cash crop production (Foster and Rosenweig 1996; Ram 1980;

Schultz 1975). However, highly educated households may diversify towards more profitable off-farm work, reducing the rate of supply of labour to cash crop production (Fachamps and Quisumbing 1998; Cook 1999). Similarly, high rates of education have also been shown to raise wage expectations, reducing the incentives for households to invest labour in on-farm production (Lopez 1984).

The education level of household members is an important factor in estimating household participation in off-farm employment (Dercon 1998; Carter and May 1999; Saith 1992). Proximity to market, differences in infrastructure, and market and population densities, are also important factors consistently associated with higher household off-farm earnings (Lanjouw 2001; Reardon et al. 2000). Reardon (1997) finds that those households with the least income and fewest agricultural assets are typically also least able to diversify into off-farm income generation because they are unable to meet the initial entry costs. In short, income inequality - resulting from differences in land endowment, education and other household assets - is reinforced by unequal access to off-farm earnings (Barrett et al. 2000; Reardon et al. 2000; Canagarajah et al. 2001).

Access to credit is also a major factor in enabling households to move into non-farm employment and self-employment (Dercon 1998; McPeak and Barrett 2001); while households use bank credit to purchase productivity enhancing farm inputs, and obtain higher income levels through on-farm activities (Delgado 1995; Eswaran and Kotwal 1986; Feder et al. 1990; Sadoulet and de Janvry 1995).

Remittance income can also be used by smallholders to purchase inputs (Adams 1998; Taylor et al. 2003), or overcome entry costs and diversify into off-farm activities (Barrett et al. 2001; Reardon et al. 1992; Reardon 1997). However, studies have shown that remittance income is also spent on household consumption rather than improving agricultural productivity and investing in income generating activities (Ahlburg 1981; Brown and Ahlburg 1999; Lipton 1980).

Secure land tenure provides an incentive for households to increase their supply of land and labour resources to cash crop production, and invest in the adoption of agricultural labour-enhancing technologies (Feder et al. 1985; Hayes et al. 1997). Secure land tenure provides households with the collateral necessary to access bank credit with which to purchase productivity-enhancing inputs (De Soto 2000; Ondige 1996). Forms of land tenure common to developing countries include communal or similar forms of shared tenure, where legal and fiduciary ownership, and the right to transfer, are held in common by a tribal or familial group (Otsukaa et al. 2001). Johnson (1972) argues that land tenure insecurity raises the cost of determining ownership and transferring access to the land under group tenure systems, reducing the value of land as factor of production under these systems. Berry (1989) explains that group tenure systems often encourage smallholders to divert labour and other resources towards defending property rights, resulting in lower overall welfare outcomes for the community.

However other authors contend that group tenure systems can result in efficient land use outcomes as long as they are transparent and have the full support of members

of the landowning group, providing examples of institutional mechanisms for efficiently managing common land resources from Malaysia and parts of Africa (Cramb and Wills 1990; Field 1984; Yaro 2010). Such indigenous institutional mechanisms for managing common land resources in remote smallholder communities, often enjoy greater local legitimacy than centrally managed legal institutions, and therefore prove more efficient and effective at avoiding 'tragedies of the commons' and ongoing disputes (Arrow 1972; Boydell and Holzknecht 2007). Such forms of 'community governance' can therefore assist smallholder households to overcome some market and state failures common in developing economies (Bowles and Gintis 2002). However, community governance mechanisms can disadvantage some group members and result in suboptimal utility outcomes when powerful members of the network use their influence to capture a disproportionate share of the benefits of common property resources, such as coastal fisheries and forest products (Beteille 1983; Dasgupta 2005).

The number of dependents supported by the household also has been shown to have an influence on the rate of supply of labour to cash crop production (Goetz 1992). Households with a large number of children, or adults aged over 65, require an increased amount of labour to be directed to home care duties, reducing the availability of labour for cash crop production (Benjamin 1992; Evenson 1978). Cook (1999) indicates that only household members aged between 16 and 65 should be considered part of the labour force. However Haddad and Bouis (1991) indicate that children aged below 18 years constitute a significant proportion of the household labour force in developing countries and therefore should not be discounted.

Households facing high rates of risk of crop failure – due to the frequency of high wind and rain events, or crop pest and disease outbreaks - may also engage in food production strategies that reduce labour efficiency, such as establishing food gardens in multiple locations separated by long distances, in order to reduce the impact of a localized crop failure event on household food production (Ellis 1998).

Households suffering from poor rates of access to fertilizer may also pursue strategies aimed at maintaining soil fertility, such as regularly shifting food production locations, resulting in a reduction in labour efficiency and lower rate of supply of labour to cash crop production (Huang and Rozelle 1995; Weightman 1989).

Where smallholder households are dispersed over large areas and serviced by poor quality marketing infrastructure, higher marketing costs reduce the rate of return to cash crop labour and encourage smallholders to withhold family labour from cash crop production (Key, Saudolet, and de Janvry 2000; Minten and Kyle 1999; Obare et al. 2003; Omamo 1998; 1998a; Pender 2006; Stifel et al. 2003).

The gender of the smallholder household head may also be important to determining household allocation of labour to cash crop production, given that in an environment of prevailing "customary" land management practices, women's direct ownership access to land may be limited (Agarwal, 1994). However in the context of demographic changes in occupational patterns, with more and more men migrating to urban areas or looking for non-farm work in rural areas, women may be gaining more control over how land resources are used (Meinzen-Dick *et al.,* 1997). Increasing female member influence over household decision-making with regards to the

allocation of resources such as land and labour, has been found to increase the productivity of labour and household livelihoods (FAO 2005; Quisumbling 2003; Tibaijuka, 1994; World Bank, 2001) Liberalizing traditional gender roles by encouraging female household members into commercial agricultural activities, has been identified to increase the overall household labour productivity (e.g Tibaijuka, 1994)

2.3 Social capital benefits and smallholder household utility strategies

Network membership and investment in strengthening the quality of relationships within networks have been identified as strategies offering 'social capital benefits' to households (Coleman 1998; Porter 1998; Putnam 1993; 1995; 2000). While contemporary explorations of the contribution of social capital to livelihoods tend to identify social capital as another endowment factor making positive contributions to household utility, accounts of the operation of social capital from new geographic areas are beginning to challenge assumptions about the universality of utility benefits provided by social capital (Cannone, 2009; Foley and Edwards, 1999; Woolcock, 1998, 2010; Naughton 2014). This is informing a new interpretation of social capital: that its impact on household and community welfare varies among cultures and contexts (Naughton, 2014).

An exploration of the literature on social capital reveals three competing narratives about its operation and contributions to private, community and national

welfare, which can be attributed to their three principal authors: Coleman (1988), Putnam (1993, 1995, 2000) and Bourdieu (1986).

Coleman's (1988) and Putnam's (1993) explanations of the operation of social capital have become the dominant narratives in the literature. Coleman (1988) sought to establish whether members of groups are motivated by rational action to obtain benefits by engaging in a process of building social capital by following informal rules of expectation, obligation and reciprocity. Coleman's (1988) exploration of social capital supposes that households engaged in social capital building are driven by the principles of utility-maximization first proposed by Becker (1964). Coleman's interpretatioon of social capital has been criticized for focussing on the quality of networks, rather than the agency of members of networks, as the principal mechanism by which differences in the social capital benefits households obtain can be explained (Thrift, 2005). His (Coleman 1988) theory has also been criticized for excluding the wider economic context and non-economic motives which may influence social capital building behaviour in different cultural and geographic spaces, such as the potential negative impact of strong enforcement of local norms and obligations on household utility outcomes among members of a network (Portes and Sensenbrenner, 1993).

In contrast, Putnam (1993; 1995; 2000) explores social capital through the proxy of individual engagement with local, regional or national 'civil society', and its impact on the functioning of democratic governance and creation of economic growth. Rather than a private good held by households, Putnam's (1993) theory identifies social capital as a public good held by (local, regional and national) communities. However Putnam's

conception of civic engagement has been criticized as excluding non-Western forms of civic engagement (Hakli, 2009) and those involving conflict which may actually reduce, rather than augment, economic growth and efficiency (Cannone, 2009). Putnam's (1993) explanation of the social capital benefits that communities derive from civic engagement has also been criticized as not having been subsequently proven empirically (Devadason, 2011; Durlauf, 2002)

Bourdieu's (1986) work on social capital explained that differences in class impacts upon the social and economic benefits that households derive from social capital. He (Bourdieu, 1986) investigated how local structures and contexts allowed powerful groups to access and exclude others from community resources. Bourdieu's (1986) interpretation highlights thatdifferences in the social capital benefits that households' derive from their membership of networks, results from competition among members for these contested resources; and that differences in class influence the outcome of these competitive processes. Bourdieu's class-analytic approach has come under some criticism for excluding social differences other than class (Radcliffe, 2004) and failing to accommodate a potential role for member agency - such as through the accumulation of endowments and social mobility – to influence the outcome of competitions for social capital benefits (Holt, 2008).

In addition to social capital benefits, membership of networks can facilitate social learning benefits which can assist in technology adoption, critical to facilitating CCI; as well as 'pooling' benefits which may increase allocative efficiencies (Collier (2002). In the influential work of Bandura (1977), social learning is defined as

individual learning from better informed network members, based on observation of others and their social interactions within a group. Social interaction through networks can also promote pooling of knowledge, when individual members all carry just a piece of requisite information. Social capital, generated by repeated interaction within a network, improves the potential for co-ordination among members. Isham (2000) finds that tribally-based social affiliations act as a form of social capital in technology adoption decisions and provide an economic justification, during the design of extension programs, for investments in social assessments in order to analyze characteristics of local social structures to identify whether they facilitate or preclude technology adoption and dissemination.

Social capital is also identified to play an important role in facilitating improved access to employment opportunities (Granovetter, M. 1995; Vanwey and Vithayathil 2013) Vanwey and Vithayathil (2013) examine the critical role of social capital in securing off-farm work, finding social networks play an important role in linking farm residents to jobs outside the farm property.

Boudieu's (1986) interpretation of social capital as a competitive process, together with Holt's (2008) identification that household agency can influence the outcome of this competitive process, provides a potential source of insight into status competition described by observors of Melanesian 'gift economies' (i.e. Gregory, 1983; Sahlins, 1973) where households obtain higher status ranks through competitive gifting of consumption goods and labour, to other members of the community. This is explored in more detail in the subsequent sections of this Chapter.

2.4 Special development challenges facing Pacific Island countries

SIDS face special development challenges related to low population densities and long distances between sites of agricultural production, and internal and export markets (Borgatti 2008; McGilvray 2008; Venables 2007; World Bank 2009). These challenges limit scale economy benefits; result in higher marketing, distribution and labour costs; and therefore reduce the incentives to invest in cash crop production (Collier 2007; Krugman 1991; Read 2008)

Smallholders in SIDS are constantly threatened by the risk of natural disaster (World Bank 2012). The PIC region is highly prone to tropical cyclones, volcanic eruptions, earthquakes, tsunamis, and droughts. The El Nino-Southern Oscillation (ENSO) weather system introduces high natural inter-annual variability in rainfall, sea levels, temperature and other climate variables (Keener et al. 2012). Weather-related risks - particularly cyclones - are a frequent occurrence across among PICs, affecting crop yields, livelihoods and assets, and the personal safety of vulnerable groups such as smallholders with the result that smallholders typically divert labour and land resources away from commercial agricultural production towards less intensive food and cash cropping systems (FAO 2011). In addition, the historical isolation of the PICs from animal and pest-borne diseases in other regions has increased the susceptibility of local agriculture and crop yields to pest and disease outbreaks (McGregor and McGregor 1999).

Almost universal access to land amongst rural PIC smallholders increases the relative cost of accessing labour through markets, given the absence of landless labourers (Crocombe 1987). As a result, households are largely dependent on family labour (McGregor 2002). Households in Vanuatu have been described as severely labour constrained, as they divide their time between subsistence food production, cash crops production and their commitments to producing gifts (e.g. pigs, yams and sweet potatoes) and contributing labour to customary inter-household exchanges (McGregor and Hopa 2007; Weightman 1989). While households are socially obliged to invest resources in these inter-household transfers, smallholder households have been observed to engage in competitive gifting in order to obtain progressively higher status levels (Blackwood 1981; Foster 1995; Huffman 2005). However the social and economic benefits of increased household status have not been empirically tested.

Understanding the dynamics of intra-household allocation of family resources is also important to understanding smallholder productivity in the Pacific Islands, and developing effective interventions for promoting engagement with cash crop production (Koczberski et al 2001). Agricultural roles in the PICs are divided sharply along gender lines: women produce and market the vast majority of food crops while men overwhelmingly produce (and control the incomes earned from) cash crops (UN Women 2012). Women and girls traditionally assumed primary responsibility for food production and family food security by growing crops in homestead gardens, rearing small livestock, and producing handicrafts. On the other hand, men principally engaged in cash cropping, and in inter-household transfers and social activities associated with

accumulating social status for the household (Bourke et al 2006; Bourke & Harwood, 2009).

Over time, as cash cropping acquired a higher status for its economic value and contribution to national development, the various kinds of agricultural work performed by women remained associated with food security and were regarded as somewhat lesser in importance in the emerging economic model (FAO 2005). The limited data from the region indicates that, faced with economic pressures, gender roles may become flexible and enable women to engage in cash crop production and processing work, which have traditionally been regarded as belonging in the male domain (Ibid). For example, evidence from Fiji indicates that despite prior taboos, female members of households engage in cane harvesting at times of labour shortage, (Carswell 2003); while evidence from Papua New Guinea (Overfield, 1998*)* indicates that women do increasingly participate in coffee harvesting – an area where smallholder households commonly face labour shortages.

Decreasing the dependence of PIC SIDS cash crop industries upon male labour would perhaps both generat significant additional household income and increase national cash crop productivity (Curry et al 2007; Koczberski et al 2006). However, female household members face a number of distinct disadvantages which may limit their incentives to increase their inputs of labour into cash crop production. Most land (98%) is under customary authority, which grants access rights to men through father-son inheritance practices and provides limited legal rights to women (Bolabola, 1986). Many women are excluded from inheritance rights to customary land and only have the

rights to use land through their fathers or husbands (UN Women 2012). This is a clear disincentive to invest additional labour in planting and effectively managing long-term cash crops like cocoa (Ibid). Similarly women also suffer from more limited access to training and credit which would enable them to increase the productivity of their labour (Koczberski 2006; World Bank 2014). As a result, the intra-household allocation of female labour to cash crop production remains low in the Pacific.

2.5 Customary inter-household transfers in rural villages in the Pacific Islands

Whilst economists have tended to focus their empirical investigation on the consumption value of inter-household transfers (e.g. Coate and Ravaillon 1993; Fafchamps 1999), sociologists and anthropologists of PIC smallholder communities have identified that inter-household transfers are also often motivated by factors other than meeting consumption needs (Cox et al. 1990; Gregory 1982; Macpherson 1994; Sahlins 1963; 1972). This body of literature has generally focused on the role that transfers play in providing additional utility to both givers and recipients, by forging closer social and economic ties between households (ibid.).

Households in Melanesia have been observed to dedicate a significant share of their labour time to contributing labour and food to group labour activities and cultural ceremonies (Gregory 1982; Huffman 2005; 2008; McGregor and Hopa 2007; Rio 2007; Sahlins 1966; 1972) and to the production of local public goods such as the construction and maintenance of villages roads, bridges and common meeting areas (Acquaye 1984;

Boydell and Smart 2003; O'Meara 1990). Households have been described as required to contribute to these inter-household transfers to meet the 'traditional land taxation' obligations associated with accessing tribal land under the customary land tenure systems (Crocombe 1983). Households have also been observed to go further than these minimum contributions to compete to supply additional increments of labour and consumption goods, with increased social status and influence over future village matters of economic importance, described as the object of this investment (Gregory 1982; Sahlins 1963; 1972; Weiner 1992). Among other potential benefits, obtaining influence over the settlement of disputes over access to tribal land and securing access to future allocations of tribal land managed by village authorities, have been identified (Foster 1995). Therefore, smallholders may derive significant future utility gains from short-term investment of household labour resources in inter-household transfers. These systems of competitive inter-household transfers have been described as 'gift economies' and as the key to obtaining 'big man status' and influence in Melanesia tribal society (Gregory 1982; Sahlins 1963; 1972).

The following chapters investigate the impact on the supply of labour to cash crop production of smallholder participation in, and receipt of exogenous inputs of labour and consumption goods resulting from, these inter-household transfers (among other household factors), and identify the implications for cocoa CCI.

2.6 Conclusion

Inter-household transfers are a potentially important new factor for predicting smallholder household farm labour supply responses in SIDS. The anthropological literature from Melanesia observes that smallholder households invest a significant proportion of their resources in status accumulation, in order to enjoy privileged access to goods and services which are subject to competing claims by households in their community, such as land and labour. This may result in the diversion of family labour from cash crop production to activities important to social capital formation, such as participation in group labour and gift production. However the predictive power of this factor must be compared to other household factors also identified in the literature as important.

This study identified from the litearature that smallholder households often withhold labour from cash crop production activities as a result of shallow input and outputs markets, high transaction costs and exposure to risk of price fluctuations and natural disaster. Smallholders subsequently develop coping strategies that see them invest family labour in diversified production strategies, including subsistence production, social capital production and off-farm activities. This results in a reduced rate of supply of labour to cash crop production**.**

Heterogeneity in household endowments and other characteristics, however, can result in households facing different incentives to supply labour to cash crop production. These household factors include their size of land, labour and capital endowments such as labour saving machinery, savings, and bank credit; household member education

levels, training levels and access to other kinds of support which can improve the productivity of labour; as well as access to input transfers of cash, goods and labour between households.

Missing markets for land and labour may also encourage households to redirect family labour resources from agricultural production to off-farm activities, where those households possess the requisite skills and opportunities. However this literature review reveals two contrasting views on whether inter-household labour transfers assist households to cope with labour market failure (Huffman 2005) or result in a net decrease in the volume of labour inputs invested in agricultural production activities (McGregor and Hopa 2007).

In the next chapter, we describe the household factors - as well as the social, environmental and economic contexts - affecting smallholder production in Vanuatu, and on Malekula. In particular the next chapter describes smallholder participation in economic activities - including food and copra production, and off-farm employment – and their participation in inter-household transfers, and the implications for cocoa CCI in Vanuatu.

3. Agriculture, land tenure, culture and labour allocation on Vanuatu: examining the literature

3.1 Introduction

This chapter provides an overview of the key factors influencing the labour supply responses of smallholders among the rural farming communities of Vanuatu, and on Malekula; and the implications for cocoa CCI.

It describes the productive activities competing for snallholder household labour in Vanuatu, and on Malekula: subsistence food production (largely done by female members of the household), cocoa and copra cash crop production, off-farm employment, and the investment of labour in inter-household transfers.

The chapter describes the number of geographic, climatic and cultural factors which may have reduced the incentive for smallholders to supply labour to CCI, including a) the additional transport costs associated with marketing cash crops from remote rural communities on Malekula to the nation's major export port at Luganville; b) the risks of crop failure introduced by frequent cyclones and other natural disasters; and, c) the high returns to labour that smallholholders have been able to obtain from 'extensive' cash crop production strategies supplemented by subsistence food production. The chapter identifies that the relative inflexibility of the labour and product quality demands imposed by modern cocoa markets, may further reduce the attractiveness of cocoa CCI relative to other activities.

This chapter also explains the critical importance of understanding the impact of Vanuatu's tribal land tenure system on smallholder labour supply responses. The chapter identifies that through this tenure system: a) all households are entitled to access to land through their membership of a tribal landowning group, eliminating landless households, ensuring access to relatively large landholdings, and reducing the quantity of labour available on rural labour markets; and, b) significant power is invested in in chiefs and principal decision-makers within each tribal group to settle land disputes and allocate 'reserve' tribal land, providing them a powerfult role in influencing the livelihood outcomes of their members. The chapter argues that these factors have combined to strengthen the incentives to transfer family labour towards inter-household transfers in order to accumulate social capital and obtain a higher status in order to influence the decisions of local elites regarding the distribution of tribal land and labour assets.

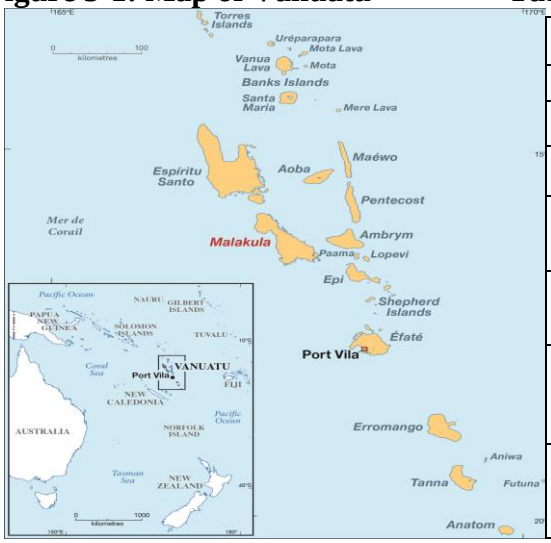
3.2 Demographics, disasters and cropping practices

Despite a total land area of about 12,000 square km, the proportion of land available for agriculture in Vanuatu is significantly reduced by mountainous topography, dense rainforests and natural vegetation estimated to cover more than 75% of the country (VNSO 2007).

Vanuatu's climate varies from wet tropical in the north to sub-tropical in the South, and is defined by a dry season (May-October) and a wet season (November-April). The wet season is characterized by higher temperatures, heavy rains and

occasional cyclones (World Bank 2012), from which the impact on island life can be devastating.

Figure 3-1: Map of Vanuatu



Source: Sheehan, J. (2012) Australian National University, Research School of *Pacific* and Asian Studies, Canberra

Table 3.1: Vanuatu--Key Economic Statistics

GDP	$787.1 million (USD)
Population	247,300
GDP per capita	$3,182 (USD)
Agriculture GDP	$168.4 million (USD)
Agriculture GDP as a proportion of total GDP	21.3%
Agriculture GDP per capita	$681 (USD)
Agricultural income as a proportion of total rural household income	71% (2011)
Subsistence income as a proportion of total rural household income	39% (2011)

Source: Vanuatu National Statistics Office 2013; 2011

More than 75% of Vanuatu's population of 247,000 lives in rural areas scattered among nearly 800 small and usually isolated communities, each averaging about 25 families (VNSO 2009; Weightman 1989). Vanuatu's population is highly youthful. In 2009, approximately 40 per cent of the population was under the age of 15 years, with a median age for the entire population of 19 years for men and 20 years for women (VNSO 2012). The 'youth bulge' presents a considerable policy challenge in terms of education, training and providing employment opportunities; and in ensuring that this next generation has access to sufficient customary land resources.

Agriculture is a critical, but declining, sector of the Vanuatu economy: contributing 21% of national income in 2012, down from more than 24% a decade

earlier (VNSO 2012a). While the absolute value of agricultural GDP has risen 34% over the last 5 years (in constant 2006 prices), the relative value of the agriculture sector to the national economy is in decline, as a result of the increasing value of services and, in particular, the tourism industry (ibid.).

The major share of the value of the service economy is captured by households and businesses in the urban areas of the two most populous islands: Efate and Espiritu Santos (IMF 2013). However, the growing wage differential between farm and off-farm activities has led to increased migration from rural to urban areas, the population of which grew by 30% between 1999 and 2009 (VNSO 2009).

In the rural areas of Vanuatu, 98% of the population participates in agricultural production (VNSO 2007) providing 71% of household income (VNSO 2010). Of this income, subsistence agriculture accounts for a larger share (39%) than do commercial agricultural sales (VNSO 2010).

Vanuatu's agriculture sector is dominated by semi-subsistence farmers using mostly household labour, and relying on few modern farm inputs (AusAID 2011). Smallholders live in self-built thatched houses constructed from locally available cane and leaf materials on collectively owned customary land. Their cooking fires are fuelled by firewood and coconut shells, and their homes lit by kerosene lanterns. Public vehicles and boats transport people and goods to market. Only 13% of smallholder households use what could be considered modern farming techniques, such as applying fertilizer and pesticides or using improved seeds or farm machinery (VNSO 2007; 2009; 2010).

Vanuatu is unusually vulnerable to natural disasters. Of all the countries in the world, Vanuatu ranks third in annual losses to GDP (almost 7% each year) due to natural disasters, principally cyclones (World Bank 2012). Since 1939 Vanuatu has experienced 125 tropical cyclones, of which 45 were categorized as having hurricane force winds. Since 1981 Vanuatu has been battered by a major cyclone on average once every 1.7 years (World Bank 2012).

The frequency of cyclones and other extreme weather events involving high wind speed has shaped traditional agricultural practices on Vanuatu in two major ways. The first strategy employed by smallholders is to scatter their food and cash crop plots at large distances from one another, in order to reduce the risk of a single weather event devastating an entire harvest (Weightman 1989). A smallholder will clear and plant an average of two to three new food gardens every 12 months, before leaving land to lie fallow for a period of up to 10 years in order to restore the fertility of the soil (ibid.). This introduces additional labour costs to clear and plant the land, as well additional time costs for travel to and from the new gardens.

The second strategy centres on the choice of primary food crops: root vegetables (McGregor and Hopa 2007), which are far more resistant to high wind speed events than crops where the food sources is above ground; yet are labour intensive to plant and maintain. Yams (*Dioscoria spp.)* - traditionally the most important for meeting subsistence food needs - require a hole up to two metres deep to be dug in freshly cleared land for each yam, taking up to 30 minutes of hard labour per hole; and each yam garden requiring weeding every two months until they reach maturity at eight

months (Jolly 1981). Taro (*Colocasia esculenta*) is the second most important staple food crop, followed closely by sweet potato; whilst the production of banana, cassava (*Manihot esculenta*) and island cabbage (*Hibiscus manihot*) also important components of smallholder food gardens (McGregor 2002).

As elsewhere in the Pacific, food crop labour is provided mostly by women; with cash crop labour overwhelmingly provided by men (FAO 1998). While men are also engaged in food cropping activities, their major role is in land preparation and planting, as well as the production of status crops such as yam for ceremonial exchanges; whilst women provide the majority of labour for the production of subsistence food crops for consumption by the family.

3.2 Copra, kava and cocoa: Crops for cash

Many smallholder households supplement subsistence production with income from three main cash crops: copra, kava and cocoa. Copra is a popular crop because it can be harvested year-round, requires relatively little processing or management, and can survive long delays in the marketing chain (McGregor and Hopa 2007). However a historical decline in copra prices due to falling global demand (Ibid), has also reduced smallholder incentives to allocate labour to copra production, leading to falling national production levels (VNSO 2011; VNSO 2013). As a result, most households produce copra only at times of peak demand for cash income (Cordelier 2006), while the majority of nuts are left on the forest floor to be consumed by rats or processed as supplementary feed for pigs and livestock (Weightman 1989).

Kava is a traditional stimulant beverage (made from the pounded roots of *piper methysticum*), which grows in rich volcanic soils on the higher inland slopes and mountain ranges. Kava is a long-term investment crop: plants must grow from 4 to 7 years before they are ready for harvesting (Pollock 2009). Kava has proven to be a good cash crop both for domestic and overseas markets although a smaller proportion of total production is marketed at present because most is consumed locally during village social practices (VNSO 2007). In addition, restrictions on the importation of kava introduced in Europe, the United States and Australia in the late 1990s and early 2000s caused a rapid fall in the world price of kava, leading to a fall in production by smallholders (Pollock 2009). As a result, in the most recent survey (VNSO 2007) only 22% of households – just over half of the total involved in its cultivation (53%) – reported selling kava for cash income.

Growing and harvesting cocoa is an increasingly important cash crop activity for Vanuatu's smallholders – on Malekula island in particular (VNSO 2007; VNSO 2013). Growers on Malekula Island produce more than 55% of the national cocoa crop (VNSO 2013). Returns to land and labour from cocoa production are potentially far higher than from copra and kava (Welegtabit and Longmore 2006). However, the cocoa tree requires far more attention and effort and is much more susceptible to losses from disease and pests than these other two cash crops, and processing cocoa is labour intensive (Konam and Namaliu 2008; Lass 2008).

After harvesting the cocoa pods, the beans are fermented for 6-7 days, and then dried for 2-5 days, before being bagged and marketed (McGregor et al. 2009). During

the ripening season, cocoa pods are harvested every 10-14 days, because pods ripen at different times. If left on the tree, the seeds will germinate inside the pods or be consumed by rats, flying foxes or damaged by insects (Weightman 1989).

The black pod fungus *Phytophthera palimvora* is also a significant problem: it infects juvenile pods, preventing maturity, and spreads rapidly throughout a plantation in dark and damp conditions, which are common on the miced tree crop cocoa plots of Vanuatu (Lass 2008). Cocoa trees require regular pruning to reduce shade upon the trunk, and weeding to ensure a good supply of nitrogen to the roots whilst removing cover for pests (principally rats) which are responsible for substantial pre-harvest losses (Daniel et al. 2011). A recent survey found that pre-harvest losses of 80% or more are common among smallholder cocoa farmers in Vanuatu due to damage by rats, black pod and over-ripe pods on unmanaged cocoa blocks (ACIAR 2011). In short, cocoa is not a flexi-time cash crop like copra and does not easily accommodate periodic increases in demand for labour from competing economic and cultural activities (McGregor and Hopa 2007).

However in 2009, the Government of Vanuatu identified that a rise in historical cocoa prices, and the long-term (and expected future) decline in prices for copra, provided both an opportunity and impetus to revitalize the fledgling national cocoa industry. The Vanuatu Department of Agriculture and Rural Development (DARD) introduced the National Cocoa Development Program (CDP) 2010-2014 and sought to engage with partners to help it deliver its program. This program consisted of three essential elements: 1) to double current national production (from approximately 1000

tonnes to 2000 tonnes); 2) to improve the quality of the cocoa; and 3) to assist growers to access higher prices available in niche export markets (DARD 2009). Given the majority of national cocoa production is provided by Malekula's growers, this strategy focused its efforts on this island.

In order to increase production, the CDP aimed to rehabilitate up to 500ha of existing smallholder cocoa plantations by focusing on promoting the adoption of crop and pest control management methods aimed at reducing pre-harvest losses from black pod and rats, and therefore improve the yields obtained from the existing resource. It aimed to obtain this increase in yield through the introduction of a new method of integrated crop and pest management which had been developed by ACIAR in partnership with the cocoa industry in Papua New Guinea (Konam and Namaliu 2008). ACIAR, with the assistance of SPC, agreed to support DARD extension workers to implement a field training programme which would engage 12 lead farmers in a number of selected cocoa growing districts and train them on the basic principles of integrated cocoa crop and pest management. Trainings were to be delivered on a small demonstration plot in each village, with farmers encouraged to establish their own demonstration plot and compare the yield and returns to labour achieved on this one plot, with the rest of their cocoa plantation. SPC were also charged with training lead farmers to maintain the production and time use records required to calculate yields and returns to labour. This would assist smallholders to identify the superior returns offered by this new method of intensifying cocoa production, and encourage them to adopt cocoa CCI as a livelihoods strategy. As a result, DARD would achieve its aim of

rehabilitating the existing national cocoa tree resource, and achieve the projected doubling of yield associated with this new cocoa production method.

3.3 The rising need for cash and a lack of money-earning opportunities

Over the last decade, household demand for cash income has risen rapidly in Vanuatu, which has led to renewed interest in encouraging CCI in rural areas (ACIAR 2009). From 2006 to 2010, expenditure on consumer goods increased by more than 118% among rural households, while expenditure on food rose by more than 84% nationwide (and by more than 89% among rural households) whilst spending on transport grew by more than 63% (VNSO 2006; 2010)

Improved mobile phone coverage on Vanuatu has led to extremely rapid phone adoption by rural households. In 2006, just 3% of rural households owned a mobile phone (VNSO 2006). This figure grew to 82% of rural householders by 2010 (VNSO 2010). However by 2010, spending on mobile phones accounted for more than 35% of total rural household expenditure on non-food consumables – second only to spending on firewood, the principal source of cooking fuel (VNSO 2010). Meanwhile, household expenditure on education – for transport, uniforms, books and other materials – grew by more than 19% over the same period (VNSO 2010). Such costs present a serious burden for cash-strapped rural households

Household have attempted to meet this rising demand for cash income by diversifying towards off-farm employment. Over the period of 2006 to 2010, the share

of rural household income provided by agricultural activities fell from 74% to 71%, whilst the share of off-farm income in total household income rose from 16% to 25% over the same period (VNSO 2006; 2010).

While opportunities to access employment off-farm have been rising in Vanuatu, formal and informal employment participation rates remain relatively low – particularly in rural areas. Indeed only 27% of households in rural areas received off-farm income of any kind, compared to 75% of households in urban areas (VNSO 2010). The informal off-farm employment sector - which includes activities such as taxi driving, market gardening, manufacture of handicrafts and participation in other cottage industries - provides the largest source of off-farm employment opportunities in rural areas; though some opportunities are available in rural areas for skilled agricultural workers on the remaining large agricultural estates, as well as for teachers and office workers in Municipal and National Governement stations (VNSO 2012).

However, the growth in employment opportunities in urban areas has attracted significant rural-urban migration from job-seekers (UNFPA, 2013). This rural population is highly mobile, with employees moving back and forth between their home islands and the capital, Port Vila (Haberkorn, 1989). Work in and around Port Vila, particularly as skilled agricultural labour or in tourism, is seasonal, encouraging frequent iterations between the capital and home island (Jowitt, 2001). This has enabled smallholder households with the right skill sets and opportunities to supplement income from agricultural activities.

Tourism is the fastest growing and single largest economic sector in Vanuatu, contributing 23% of GDP in 2013 (VNSO 2014). In 2014, Vanuatu received 329,013 tourists, with 108,808 arrivals by air and 220,205 by cruise ship (VNSO 2015). Tourism is also currently the main creator of employment in Vanuatu, supporting 38,700 jobs representing 55% of total formal sector employment (World Travel and Tourism Council 2014)

Malekula has begun to see a growth in tourist numbers, with four flights a week from Port Vila and 18 visits a year by the cruise ships Pacific Jewell every year bringing up to 35,000 tourists per year to the island. The growth in demand for adventure, cultural and eco-tourism experiences is also creating employment opportunities outside the capital (IFC 2014). The development of products such as village cultural visits, jungle treks and mountain climbs has created additional employment opportunities for drivers, cultural performers and staff for the guest houses and small restaurants servicing this new tourist market on Malekula.

However, off-farm employment opportunities on Malekula remain limited, and geographically concentrated around the location of government offices, guesthouses and agricultural estates near Lakatoro town and the airstrip at Norsup. As a result, for many smallholders the best prospects of obtaining off-farm income are presented by urban migration. Those without access to off-farm employment opportunities in urban areas, or on Malekula will continue to depend on agricultural activities – and cash crop production in particular – to satisfy their growing demand for income.

3.4 Disincentives to intensify cash crop production: poor transport infrastructure and taxes

As previously highlighted, the high costs of marketing cash crops due to the country's poor road and maritime transport infrastructure provide a disincentive for smallholders to invest additional labour and household resources in cash crop production (ADB 2010; AusAID 2007). The geographic dispersion of Vanuatu's population among a number of small islands, at low densities, has perhaps contributed to the inability of the Government of Vanuatu to establish and maintain a network of road and marine marketing infrastructure adequate to keep marketing transport costs to a minimum (ADB 2010). The land transport network in Vanuatu consists of about 1,800 km of roads – 90% of it unsealed and located on two islands, Efate and Espiritu Santos (ADB 2010). As a result, land transport passengers face cost of 25 vatu (US$0.30) per passenger per kilometre, with figures much higher for the outer islands (ADB 2010).

In rural areas, unregulated owner operators largely provide land transport. Freight charges can vary significantly depending on the level of demand from other passengers, the predicted value of the freight, the distance covered, and the whim of the driver (FAO 2014). Sea freight is not an efficient alternative for transporting cash crops due to the low number of intra- and inter-island freight vessels, as well as loading and unloading points. Indeed, there are only 36 jetties and wharves across Vanuatu's 80 islands (ADB 2010). Consequently, the distance between a farm household and its

closest marketing centre is a crucial factor in determining income from cash crops (AusAID 2007).

The national and provincial taxes levied on the export of agricultural commodities introduce additional disincentives to produce cash crops (World Bank 2014). The Government of Vanuatu applies a provincial tax of 3% as well as a national tax of 7% on the Free On Board (FOB) value of cash crop exports, which effectively reduces the price received by small-holders by 10% (World Bank 2014).

Vanuatu's wharves are among the most expensive in the world from which to export: for example, the cost of exporting a container from Vanuatu (US$1690) is 3.7 times the cost of shipping from Singapore (World Bank 2014). The high cost and poor efficiency of port handling services further reduces the farm gate prices than can be offered for the sale of cash crops.

In short, smallholders on Vanuatu face multiple disincentives to allocate labour to cash crop production as a result of the transaction costs associated with marketing cash crops. The next section explores the cultural factors that may also militate against increasing the supply of labour to agriculture for money.

3.5 Customary land tenure and cultural factors influencing the allocation of smallholder labour

Anthropological research suggests that smallholders in Vanuatu supply a significant proportion of their time and labour to the production of surplus food for offering as gifts at ceremonial feasts, celebrating births, deaths, marriages,

'circumcision' coming-of-age, and achieving attainment of a customary rank by a leading member of the community; and participating in village meetings and group labour activities (Blackman 1981; Foster 1995; Huffman 2005; McGregor and Hopa 2007; Rio 2007; Rodman and Ward 1995; Weightman 1989).

Traditionally, social status or rank differentiation in Vanuatu society was directly attributable to the competitive 'gifting' of important *kastom* wealth items (e.g., tusked pigs and woven matts) (Allen 1980; Huffman 2005), as in other 'gift economies' described elsewhere in Melanesia (Sahlins 1963; 1972; Gregory 1982; Weiner 1992). In these 'gift economies,' creditor households use gifts of wealth and consumption items to generate leverage over other community members to secure ongoing support in important social and economic decisions, as well as to secure the provision of supplementary labour and goods (ibid.).

According to traditional practice, rural smallholder households in Vanuatu are also obliged to provide labour to group 'village activities' on special days determined by local chiefs, church elders or other high-status men, with each session taking from several hours to a full day (ACIAR 2012; Kalnpel 2012). These activities can include anything from mending bridges and maintaining public meeting places, to assisting private households with their harvest (ibid.). While all households are expected to contribute some labour to these group activities, the benefits from such inter-household transfers of labour are not equally shared - a point that will be developed later.

A recent national survey found that such customary labour practices are still strong in rural areas (Malvatumauri 2013). Approximately 83% of rural households

reported volunteering time or labour to group ‘village activities’ within the previous year; and of these, more than 91% had contributed labour towards agricultural activities (ibid.). Rio (2007) found that households operate under significant pressure to produce surplus food to contribute to cultural ceremonies, which are held almost every week from May through August. These commitments have been shown to reduce the amount of household labour available for cash crop production (McGregor and Hopa 2007; Weightman 1989).

Approximately 98% of all land in Vanuatu is managed under customary tenure arrangements (AusAID 2007). Family claims to the use of customarily managed land may be inherited through either the maternal or paternal line, and user rights can be transferred between members of the tribal group (Crocombe 1987). However, the entire land title system on Vanuatu relies entirely upon oral testimony rather than legal records, a factor identified as contributing to the large number of active land disputes in rural areas (AusAID 2007; Ellum 1995)

Some 92% of rural households were identified to have acces to customary lands; and of those with access to customary land, only 8% of reported have access to any kind of formal lease (Malvatumauri 2013). The same survey (ibid.) identified that roughly 63% of all villages on Vanuatu had active land disputes, with uncertainty about land boundaries one of the three leading reasons given for land disputes; with the other two reasons reported either as local land shortages causing disputes over previously unutilized land, or as challenges to the customary right to particular plots of land.

The Customary Land Tribunals Act of 2001 gave jurisdiction over customary land disputes to a hierarchy of customary land tribunals, starting with the village land tribunal and ending with the island land tribunal. Tribunal membership comprises chiefs and elders (World Bank 2009). All land disputes must be referred to the Island tribunal by local authorities, ensuring that ultimate power over the allocation and reallocation of tribal land lies with local authorities (Acquaye 1983; AusAID 2008; Boydell and Hotlzknech 2003). Uncertainty over boundaries and tenure has encouraged households to effectively increase the permanence of their claims to land by planting large areas of tree crops which, under a tribal system, are recognised as the private assets of households (Bonnemaison 1984). It has also enabled local elites to use their authority over the allocation of tribal land to extend their own personal landholdings and those of their allies (Rodman and Ward 1995).

According to Rodman and Ward (1995), who studied modes of land acquisition in one community of Vanuatu, high-status men manage to acquire larger land holdings than their peers due to the influence they exert over decision-making on tribal land matters. While inheritance is the primary mode of transmitting land-use rights, land acquired by powerful men in exchange for some form of payment or promise of payment represents another significant category of land-use rights transfer.

Rodman and Ward (1995) found that, among their sample of Vanuatu smallholders, 31% of the land owned by the community was controlled by just 5% of households. High-status households were more successful in leveraging their status to motivate community members to work their land in exchange for nominal payment

(e.g., food gifts) or the promise of future favours. Perhaps as a result, the income of these elite households was up to five times the mean for all households in the tribal group. Rodman and Ward (1995) conclude that the primary motivation for inter-household transfers of labour and gifts is the hope of securing additional land and labour for agricultural production.

Women play a far less active role in these inter-household transfers of labour, perhaps as a result of their limited opportunities to obtain land titles and their underrepresentation on land tribunals, which resolve customary land disputes (Naupa and Simo 2007). Under Customary tenure, land use rights and inheritance rights are determined by the customary traditions of the landowning tribal group with the result that, throughout most of the country (including Malekula), women have very limited rights to control and manage land and only have rights to use land through their husbands, fathers and brothers (IFAD 2013). If her husband dies, these rights are usually lost. In 2009, the Vanuatu land registry reports that of the 30,000 registered leases fewer than 20 are in the sole name of a woman (World Bank 2009).

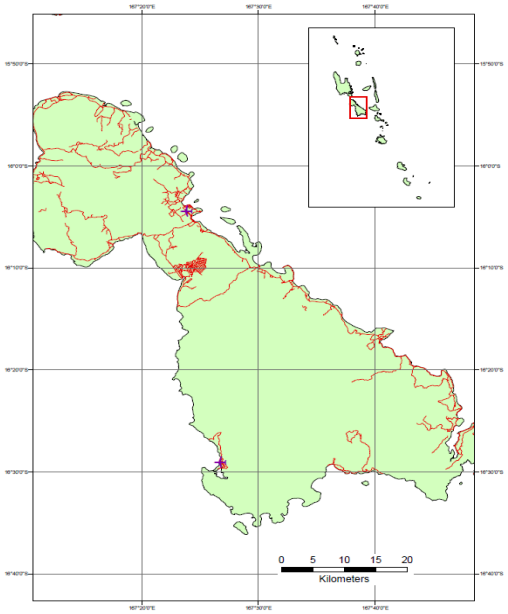
Together the anthropological and sociological literature suggests that strong incentives exist for smallholders to invest household labour in inter-household transfers and social capital formation to secure their current current landholding claim and improve their chances of accessing supplementary inputs of land and labour in the future; but that as a result of their limited access to land and involvement in cash cropping, women face fewer incentives to invest labour in inter-household transfers.

The next two sections describe whether these factors remain as important among the smallholders of Malekula.

3.6 Malekula Island: Demographics and infrastructure

Malekula is the second largest island in Vanuatu, with a land area of 120,000 ha, and more than 80,000ha of arable land (VNSO 1983). Malekula is encircled for the most part by a narrow coastal plain, and has an incredibly rugged interior made up of very steep ridges carved by deep creek and river valleys (VNSO 2007). The coastline is ringed with coral reefs and rocks, with few beaches and landings.

Figure 3.2: Map of Malekula Island



Source: Sheehan, J. (2012) Australian National University Research School of Pacific and Asian Studies, Canberra

Table 3.2: Malekula household income

Source	USD	Percentage
Consumption of own food production	463.88	39.99
Sales of cash crops	403.80	34.81
Wages and salary	133.60	11.51
Sales of livestock	59.08	5.09
Gifts	40.23	3.46
Sales of handicrafts and manufactured items	32.39	2.79
Sales of vegetables	17.22	1.48
Sales of seafood	9.71	0.83
Other cash income	4.70	0.04
TOTAL	**1164.60**	100

Source: Vanuatu National Statistics Office 2010

The island is home to 22,934 residents and 4,958 households, of which 73% were actively engaged in agricultural activities in 2012 (VNSO 2012). Smallholders on Malekula tend to use few technological inputs in their farming practices (VNSO 2007). As elsewhere on Vanuatu, smallholders on Malekula establish on average two to three new food gardens every year, covering a total area of less than one hectare though dispersed over a wide area. Although some Malekula households (17%) use improved plant varieties, virtually all smallholders use no fertilizers or purchased inputs (ibid.).

On average, households on Malekula derive 86% of their income from agricultural activities (VNSO 2013). Roughly 40% of the total value of these agricultural activities came from subsistence farming activities, while 35% came from sales of cash crops; although many households (59%) sold less than a quarter of the value of their produce. Strikingly, considering their dependence on agriculture, two-thirds of the adult members of Malekula's rural households reported spending less than 20 hours per week on all agricultural activities, and 36.4% spent less than 10 hours per week (VNSO 2007).

All cash crops produced on the island by smallholders are shipped via a single wharf at Litzlitz, on the northeast coast of Malekula, to the nation's main export port at Luganville. Litzlitz wharf is located 3km south of Lakatoro - the capital and main commercial centre on Malekula. With 2,100 tonnes of ship freight a year, Lizlitz is the third busiest port in the nation, with approximately two large or medium boats stopping there every week, in addition to irregular visits by smaller boats carrying goods picked

up at the small jetties on the northwest and southwest coasts of the island (ADB 2010). In 2010, the freight rates from Litzlitz to Luganville were 70 Vatu (approx. US$0.66) per kg and 2000 Vatu (approx. US$19) per passenger (ibid.).

The island road network consists of an unsealed coastal road that does not fully circumnavigate the island, supplemented by a single unsealed east-west road and village tracks into the interior (Ministry of Finance and Economic Governance 2013). Malekula's 160 km network of coral roads extend along the coastline from Malua Bay on the northwest coast, along the north and northeast coast, and south to Lamap in the southeast, with spurs extending across the island from Lakatoro to Brenwe in the northwest and south, and to Vinmavis on the west coast (PWD 2006). Poor road maintenance and drainage, together with regular tropical downpours, make much of this network difficult and expensive to navigate outside the dry months. In particular, two large rivers – the Pankumu, located half-way down the east coast, and the Brenwe, on the northwest coast – often render the road impassable, leaving parts of the northwest and the southeast cut off from the main export port for months at a time. One road running west across the mountains from Lakatoro provides the only road transport link between the port in the east and west coast of the island (ibid.).

Private vehicles – typically one-tonne pickup trucks – provide both freight and passenger transportation to Liztlitz wharf (Kalnpel 2012). Charges are high: about 50 Vatu (approx. US$0.43) per person or bag per kilometer, and escalate further for poor roads and at times of peak demand (ibid.). Private taxi boats, typically open, 5 or 6 metre boats with 15-30 horse power outboard motors run from various launches along

the coast collecting freight and passengers (ADB 2010). As with road vehicles, the water taxis tend to be relatively expensive, and are a poor option for transporting agricultural cargoes sensitive to seawater contamination, such as cocoa (Kalnpel 2012). The almost complete absence of a road network in the south and southwest of the island makes it difficult for communities in those areas to get their produce to market (Ministry of Finance and Economic Governance 2013). In short, the cash crop marketing infrastructure available to rural households on Malekula are expensive and unreliable (ADB 2010).

3.7 Customary and cultural factors affecting labour allocation on Malekula island

Although Malvatumauri (2013) identified that a large majority of households supplied family labour to group 'village activities,' ACIAR (2012) observed that these inter-household transfers benefited households on Malekula at different rates.

As elsewhere in Vanuatu, inter-household transfers of labour and other resources are a common feature of village life on Malekula (Allen 1980; Blackwood 1981; Huffman 2005; Huffman 2008). Each household on Malekula is obliged to contribute at least one person-day of labour to a weekly 'Chief's Day', as well as to other weekly 'theme' days – for example, 'youth day', 'women's day', 'church day' and 'co-operative day' – during which the chief and important local men direct labourers to undertake public works activities, or provide supplementary labour to selected households (ACIAR 2012; Kalnpel 2012). Therefore, rural villagers may contribute

labour to ‘non-household’ activities up to four days every week (ACIAR 2012). As a result, the demand for household labour from inter-household transfers has been thought to be an important factor influencing the rate of supply of labour to cash crop production, and the adoption of CCI (ibid.).

Village labour supplied to public works activities provides public good benefits to all members of the community, including through the maintenance of bridges, roads and meeting places (ACIAR 2012; Kalnpel 2012). However the supply of village labour to private households rewards a smaller number of households with supplementary agricultural labour, such as for clearing land for planting, or harvesting crops (ibid.)**.**

Private beneficiaries of supplementary agricultural labour are expected to reward labourers with food and kava at the end of the day (Tahapat 2012). However, the estimated value of this nominal payment (300 Vatu per man, or US$2.84) is less than one-fifth of the daily wage for an agricultural labourer: estimated at between 1500 – 2000 Vatu, or US$14.40 – $19.20 (ibid.). Therefore the supply of village labour rewards select households with supplementary labour at a rate significantly lower than the market rate.

3.8 Conclusion

This chapter identifies that rising cash needs, falling copra prices and poor levels of access to off-farm employment for many rural households has led the Government of Vanuatu to prioritise cocoa CCI. The chapter explains, however, that the supply of

labour to cocoa CCI production by Vanuatu's and Malekula's smallholders may be constrained by: 1) frequent natural disasters; 2) the transaction costs imposed by poorly developed, expensive and inefficient transport and transshipment infrastructure; 3) by their maintenance of labour-intensive and relatively inefficient food production and cash crop production 'extensification' strategies; 4) by shallow rural labour markets; 5) by insecure land tenure; and 6) competing demands for family labour from inter-household customary transfers, alternative cash crops and off-farm employment. The chapter explains that households on Malekula may be motivated to increase their supply of labour to inter-household transfers in order to generate the social capital required to access supplementary inputs of land and labour in the long-run; and that this may provide a previously unidentified barrier to the adoption of cocoa CC in Vanuatu, and on Malekula.

In the next chapter, we will explore the statistical methods used to collect primary data from a sample of smallholder households on Malekula, in order to establish the utility benefits of these inter-household transfers; and the implications, for CCI.

4. Methodology

4.1 Introduction

The two previous chapters identified the key factors influencing smallholder labour supply responses in the literature, as well as those of smallholders in Vanuatu and on Malekula. This chapter outlines the methodology selected to explore the key research question: 'is labour-led CCI an effective strategy for increasing household utility amongst the semi-subsistence farmers in Vanuatu?' Consequently, the chapter explains the development of the three survey instruments used for collecting primary data from a sample population of smallholders on Malekula, as well as the research methodologies used to quantify household labour supply responses.

This chapter outlines the theory supporting the selection of these research methodologies. This includes the use of Best Worst (BW) scaling methods to identify the most important factors affecting household motivations to supply labour to inter-household transfers, combined with Latent Cluster (LC) analysis to identify and describe similarly motivated sub-populations in the sample set. The BW methodological approach is employed as it is the most effective means of answering the subsidiary research question 'what social and economic benefits are the most important factors motivating households to supply labour to inter-household transfers' by establishing the utility benefits offered by inter-household exchanges in both the short and long-run, without recourse to a panel data set. LC method of analysis is employed by this study

because it is the most effective mechanism for answering the subsidiary research question ‘can distinct clusters or sub-populations be identified to distinguish how and why household supply labour to inter-household transfers’, by capturing information on heterogeneity in the sample population. The Ordinary Least Squared (OLS) regression method is employed to identify the strength of positive and negative correlations between household characteristics and the assignment of supplementary village labour to select households, in order to understand whether differences in household. This method of analysis is employed as it is the most effective means of answering the subsidiary research question ‘what household endowment factors are significantly correlated with the assignment of supplementary labour by village authorities?’ Finally, this chapter uses a robust, two-step estimator to investigate the impact of the assignment of supplementary village labour on household labour supply responses to competing on and off-farm activities. This method of analysis is utilized as it is the most robust means of answering the subsidiary research question ‘what is the impact of the assignment of supplementary labour on the supply of family labour to cash crop production, and other on and off-farm activities’ by simultaneously predicting and therefore providing a means of comparison of the labour supply responses of households assigned and not assigned labour.

This chapter begins with a description of the process of development of the two survey instruments used to improve the subsequent household questionnaire, followed by a discussion of the methods used to select the respondent households, data entry and cleaning, and analysis.

4.2 Survey Instrument Development

Two initial survey tools were designed to support the development of a more detailed household questionnaire capable of accurately measuring household labour supply responses amongst the smallholders of Malekula Island.

The first survey recorded the hourly labour allocation decisions made by 50 rural head of households, over the course of two months in 2011 (July and November). The second survey recorded the impact of a field trial of an integrated pest and disease management (IPDM) method for improving yield, on the labour supply decisions made by 72 rural cocoa farmers during a 12 month period (July 2011-June 2012). These two tools enabled the survey team to quantify each household's total supply of labour to food crop, cash crop and village labour activities; and estimate the impact of improved yield rates, on cocoa CCI methods. They also contributed to significantly improving the study team's understanding of current agricultural practices and the role of inter-household transfers in household labour allocation strategies; and therefore, informed the development of an accurate and culturally sensitive, household survey instrument.

Household labour allocation diary

A series of key informant semi-structured interviews with farmer representatives undertaken during 2010 identified that cultural and economic constraints to labour-led cocoa CCI were a major impediment. The interviews were carried out in partnership with two cocoa co-operatives on the island – the Cocoa Growers Alliance (CGA) and the Vanuatu Organic Cocoa Growers Alliance (VOCGA) who introduced the study

team to the leading cocoa farmers in different locations across the North West (Unmet, Brenwe) and Central (Lingerak and Hatbol) Area Councils on the island. Working with the co-operatives ensured that the initial qualitative information was collected from cash crop producing households, rather than households with less developed links to market.

The interviews provided evidence that demand for household labour from subsistence food production and customary inter-household transfers competed with time for labour-led CCI. The key informant interviews provided some qualification of evidence from elsewhere in Vanuatu that smallholder farmers in Vanuatu invested a minor number of labour inputs in cash crop production (e.g. VNSO 2007; Fenetrenie et al. 2011). These two studies demonstrated the need to measure the allocation of household labour to competing farm and non-farm activities in order to accurately measure the labour supply responses of rural households to cash cropping. Specifically, the research sought to measure the total number of hours per week dedicated by heads of cash crop producing households to cash crop production, food crop production, inter-household transfers and leisure time.

Fifty lead farmers were selected from the three cocoa co-operatives on Malekula with the highest levels of cocoa production. Each farmer was asked to keep a diary of their daily farm and non-farm activities, for two different months of 2011: July and November. These months were selected in order to offer a good insight into labour allocation across the year, with July representing a busy time – when the cocoa harvest, yam harvest and a number of customary celebrations generally coincide – and November representing a period of low labour demand.

Households were asked to indicate what their activity was for each hour of the day between 8am and 7pm, Monday to Saturday. Respondents selected from a list of 26 possible activities corresponding to four main categories: 1) activities contributing to food crop production; 2) activities contributing to cash crop production and marketing; 3) activities relating to customary inter-household transfers; and 4) leisure activities.

Time spent engaged in hunting and fishing was considered a contribution to household food production, and therefore was included in category 1. Feeding and tending to livestock was also considered a household food production activity, and included in category 1. Work in an around the house was determined to be a leisure activity, given that true housework is largely done by non-heads of households, and therefore was allocated into category 4. The key informant interviews identified that while some of the time allocated to category 4 is spent socializing over kava and playing soccer, it is also used to provide services to other members of the community and therefore could be considered devoted to social networking. Similarly, it was difficult to determine from the records whether trips to Lakatoro should be considered a cash crop marketing activity, or a leisure activity, and therefore divided equally among these two categories.

Cocoa management field trial

A second record keeping exercise was undertaken in order to gather information to help estimate the labour supply responses of households under improved market conditions. A number of leading cocoa farmers were asked to participate in a trial of a

cocoa CCI method: cocoa Integrated Pest and Disease Management. Each farmer recorded their monthly cocoa production and labour inputs for their trial plots over a 12 month period: from March 2011 to March 2012. At the end of the 12 month trial period, the comparative results were calculated to determine the economic incentives for adoption of IPDM. Subsequently, each farmer was interviwed in order to determine whether they would continue to use IPDM on their plantation after the trial.

Seventy-two farmers from 10 different cocoa co-operatives were selected and trained on both a high- labour intensity and medium-labour intensity method of IPDM, as well as a standardized model reflecting current cocoa management practice (low-labour intensity) so that the only variable input in the 12 month trial was the amount of labour supplied to the three cash cropping techniques: low, medium and high labour input.

Each of the 72 participating farmers was assisted to establish three trial plots of 25 cocoa trees, and given a 12 month plan setting out the different cocoa management actions to be carried out in each plot, every month, for the period of the trial. Each farmer was also required to keep a record of the number of hours of labour spent in each plot every month, as well as record the number of cocoa pods harvested from that plot that month. This enabled the researcher to determine the volume of cocoa beans produced per plot, per hour of labour inputs, over the trial period. This information was used to calculate the returns to labour of each cocoa management method. At the end of the 12 months, participating farmers were asked to indicate which cocoa management

technique they intended to continue to use. Their responses were used to inform an estimation of the likely adoption rate of high-labour intensity IPDM, and cocoa CCI.

4.3 Household Questionnaire Development

The final household survey instrument was designed to collect accurate and culturally appropriate, quantitative information on the factors affecting the supply of labour supply to competing on and off-farm activities, by smallholders on Malekula. The information collected included socio-demographic household variables, environmental variables and institutional variables; as well as labour supply information, household income and expenditure information, and a test of participants' knowledge of productivity enhancing farm management techniques.

The household survey instrument was developed in three steps: *first*, building a draft of the questionnaire; *second*, pre-testing the questionnaire; and *third*, refining the questionnaire. An initial draft of the questionnaire was developed April-May of 2011 with advice from the Global Food Studies team at the University of Adelaide, based on information from previous market participation studies in Southeast Asia (e.g. Neven et al. 2009; Rao and Qaim 2011; Schipmann and Qaim 2010). The Vanuatu National Statistics Office (VNSO) contributed also to the development of the questionnaire, drawing on their expertise from surveys of agricultural production, household income and expenditure and the operation of traditional cultural institutions in rural Vanuatu (Malvatumarai 2013; VNSO 2007; VNSO 2013).

This survey instrument was designed to capture information on household crop production activities and the allocation of labour to inter-household transfers. The survey for this study was pre-tested among 480 non-randomly selected households on Malekula, in June and July of 2011. The pre-test survey was translated into the local language (Bislama) to facilitate this. The aim of pre-testing was to evaluate the efficacy of the survey design, and identify how well the original meaning of the survey questions had been captured in the translated version of the survey.

Through the pre-test it was identified that an English version of the survey would ensure that an accurate meaning of the question was effectively conveyed by the enumerators, and that a large number of questions could be removed in order to reduce the amount of time taken to complete each questionnaire. The pre-test also showed that the survey components measuring the supply of household labour to cash and food crop production activities should be simplified; while additional questions on the supply of labour to inter-household transfers should be included in the final questionnaire. These recommendations helped to refine the questionnaire in late 2011 and early 2012. Subsequently in May 2012, a final version of the household questionnaire was completed.

In August 2012, twelve experienced enumerators were recruited and trained over the course of a five-day session, with support from the VNSO and the University of Adelaide. The training session focused on improving the enumerators' awareness of the amended sections of the questionnaire, and finalizing the schedule for field implementation. 12 enumerators were hired (two for each Area Council), and six

enumerators wete identified as Area Council supervisors (one for each Area Council). A former staff member of the VNSO was hired as a principal supervisor.

Field surveys utilizing the final version of the question were carried out from September 2012 to March 2013, including a two-month hiatus during December and January when travel around the island was made difficult by frequent rain and the poor condition of the roads.

The questionnaire sought to capture detailed quantitative information on the characteristics endogenous and exogenous to household labour allocation decisions, as well as their stated motivation for allocating household labour to inter-household transfers. The final questionnaire included ten sections: household characteristics; household income sources; household expenditure items; household landholding; household and farm assets; household access to credit and bank accounts; household labour allocation decisions; household food production practices; household cash crop production practices; household participation in inter-household transfers; household motivations for participating in inter-household transfers. Each section consisted of multiple choice questions, binary questions and questions with unlimited values.

The **household characteristics** section sought to provide basic information on each member usually present in the household (identified as present for at least three months in the last year), including: whether they were the head of household, as well as their age, sex, education level, marital status, years of schooling, main activity, and their second most important activity. The members of households included the head of household and spouse, their children, their grandchildren, and extended family members

who live in the household. The aim of this section was to ascertain the size of the household labour pool (having removed remove family members too young, too old, or not usually present in the household), and the factors affecting the supply of that labour to on and of-farm activities.

The **household income sources** section was designed to obtain an estimate of the household cash income, by source, over the last 12-months; as well as information on changes in the importance of each income source over time. The sources included sales of agricultural goods, off-farm income, gifts and remittances. No information was able to be collected on the value of subsistence production, and therefore the comparatuive returns to labout offered by thid economic activity were not explored in this study.

The **household expenditure items** section captures information on the household annual expenditure on its operations, consumption goods, and gift payments in cash and in-kind; as well as changes in importance of this expenditure category over time. It did not include household expenditure on subsistence food production consumed by the family.

The **household and farm assets** section identifies whether or not the household possesses any wealth assets such as a generator; any assets to assist with marketing of their farm produce such as a mobile phone, motorbike, car, truck or horse; any labour-saving farm production assets such as a chainsaw, a pruning saw, and a wheelbarrow; or any of their own cash crop processing equipment, such as a cocoa drier or fermentation unit. The aim of this section is to identify whether the household possesses any assets to

facilitate their engagement with markets, or assets indicating a larger or more regular income stream.

The **household landholding** section is designed to collect information on the characteristics of the landholding used by the household, including: the size; the tenure under which the land is farmed; whether the size of the household's landholding had changed in the last five years; and the method by which the size of their landholding has changed. The questions in this section are organized to capture separate information on each landholding plot.

The **household access to credit and bank accounts** section identifies whether or not the household has a bank account now, or five years ago; whether or not they have accessed a loan in the last five years, or there have been changes in the household's access to loans over time; and what the loan might have been used for. This section identifies whether or not households have access to a mechanism for saving surplus income or accessing supplementary capital during periods of income deficit.

The **household labour supply decisions** section measures the number of hours per week committed by the head of household, and all members of the household, to food production, cash crop production and inter-household transfers. This section investigates the mean proportion of labour allocated to each, and identifies which households are more heavily invested in each of the competing economic activities.

The **household crop production practices** section identifies the volume of both household and non-household labour allocated to a range of food crop production and cash crop production activities, over the course of the previous 12 months. It identifies

the source of non-household labour and how it was compensated. This section identifies whether or not non-household labour is utilised for specific activities at set times of the year in order to address household labour supply deficits in food crop and cash crop production at times of peak demand; whether or not there are any major differences between the use of non-household labour for cash crops and food crops; and whether there are differences in the value and type of enumeration offered to different categories of non-family labour.

The **household participation in inter-household transfers** section establishes what types of village activities household members are expected to attend and do attend; how many days per week they usually spend engaged in such meetings; and what activities they undertake.

The **household motivations for participating in inter-household transfers** section provides a number of choice experiment sets designed to capture information on the 'best' and 'worst' motivation households face to contribute to inter-household transfers. The motivations tested include reciprocal economic benefits, social capital benefits, and payments of tribute to village hierarchy.

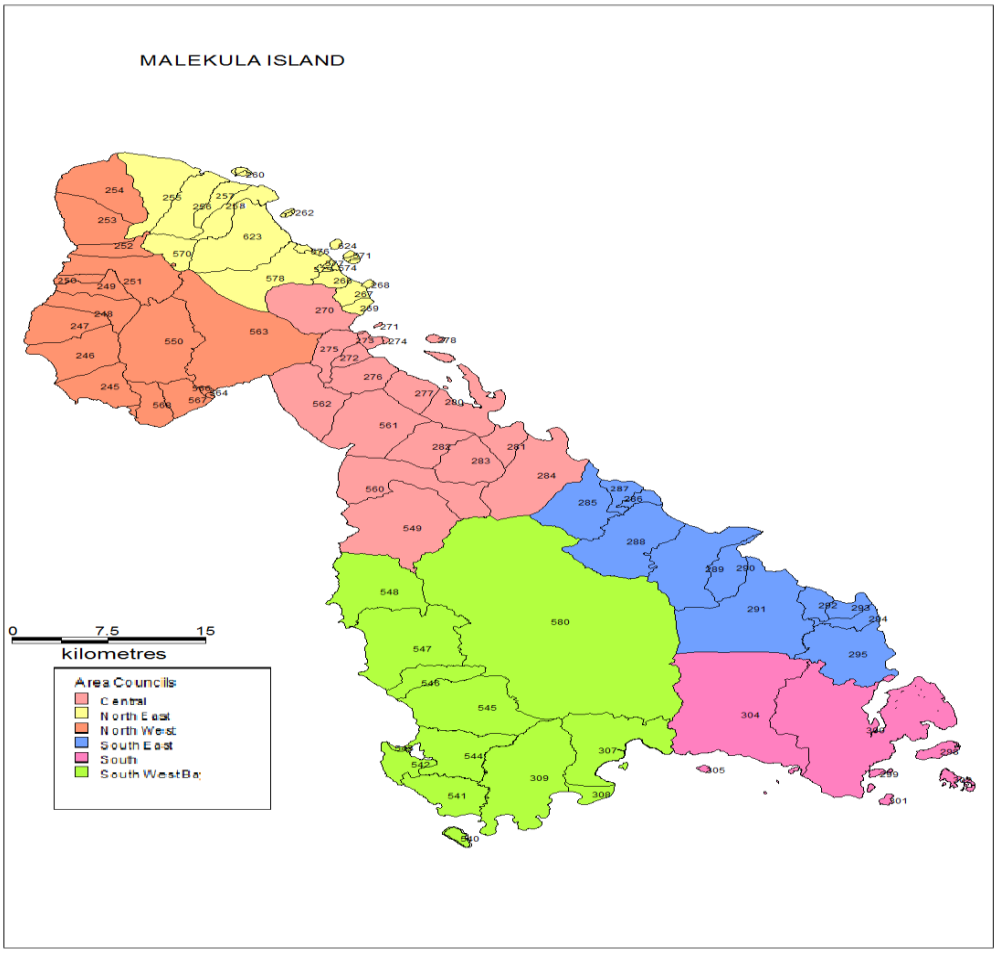
We did not use gender of the household head as a factor because results of pre-testing indicated that less than 5% of sample households were headed by a female, rendering statistical analysis difficult (given such a small sub-population size); and that our semi-structured interviews revealed a trend (confirmed in the literature) that women had very little say over the allocation of household labour to land resources –

particularly to cash crops. Further research, using a large sample size, is required to further explore the different labour supply responses of households headed by females.

4.4 Sample selection

The 2009 Vanuatu Population and Housing Census (VNSO 2012) documents 4958 households on Malekula Island and surrounding atoll islands. Malekula includes 63 enumeration areas in 6 Area Councils: North East, North West, Central, South, South East and South West Area Councils (Figure 4.1). The 2012 census identified that 73% of households on Malekula had sold agricultural crops in the last 12 months (VNSO 2012). The most recent Household Income and Expenditure Survey (VNSO 2013) estimated that 98% of households on Malekula had derived some income from subsistence agricultural production. Given the high level of household engagement in farming activities across Malekula, the sample frame utilised the full list of households on Malekula developed during the 2009 Population and Housing Survey. The VNSO provided a list of all households on Malekula including a unique identifying number, GIS reference point, Enumeration Area and Area Council.

Figure 4-1: Map of Malekula Island by Enumeration Area and Area Council



After consulting the household GIS points on the computer software Quantum GIS 1.7.4, 311 households were located on atoll and micro-islands surrounding Malekula, where an absence of cash crop land (due to small size and sandy soils) excluded them from participating in most sections of the survey. Therefore it was decided to remove these households from the sampling frame. Subsequently the 4647 households on Malekula Island were included in the sample frame. It was identified that a valid sample of households on Malekula would need to include at least 10% of households on island, in each of the 6 Area Councils, to avoid a geographic

concentration of households in the more populous Northern part of the island. In order to achieve this, the sample was stratified by Area Council to ensure that 10% of the households in each Area Council were included in the sample. This resulted in a sample of 600 households.

The selection of the sample households therefore involved a one-stage random selection process using Area Council as the strata, where the probability of selection was the sample size (10% of households) divided by the total size of the strata (each of the 6 Area Councils). The sampling weights will be the inverse: total size of the strata / number of households interviewed and valid.

Table 4.1: Household sample selection process

Area Councils	Enumeration Areas	Allocation of 600 HHs in the councils				
		Tot HHs	= sqrt(1)	=%(2)	=600*(3)/101	=round(4)
		(1)	*(2)*	*(3)*	*(4)*	*(5)*
CE	14	987	31.42	19.04	114.26	114
NE	15	985	31.38	19.02	114.15	114
NW	17	927	30.45	18.46	110.74	110
SE	11	776	27.86	16.89	11.32	102
SO	2	388	19.70	11.94	71.4	72
SW	10	584	24.17	14.65	87.9	88
Grand Total	**69**	**4647**	**164.97**	**100**	**100**	**600**

Data were collected from face-to-face interviews with the household's primary decision-maker (head of household). When the primary decision-maker was temporarily absent or unavailable, the enumerator returned to the household a second time to conduct the interview. If the primary decision-maker was not able to be consulted on this return visit, the enumerator was instructed to proceed to interview the secondary decision-maker (usually a spouse). During the execution of the survey, 50 households from the more peri-urban Central Area Council (CE), and 20 from North West Area Council (NW), were absent from the survey results for one of a few reasons: they were unable to complete the survey because of no agricultural production activities; they were unwilling to provide information on their income and expenditure habits; or, neither the head of household or nor spouse was able to be surveyed due to their repeated absence during each of 3 visits from the survey team. Subsequently, 530 full and complete surveys were included in the final data set. As a result, the dataset is under

representative of the CE, and slightly under representative of NW, when compared to sample; leaving the remaining Area Councils slightly underrepresented in the dataset.

Table 4.2: Comparison of Surveyed Households with Selected Households

Area Councils	Enumeration Areas	Selected Households		Surveyed Households	
		#	%	#	%
CE	14	114	19.04	94	17.74
NE	15	114	19.02	108	20.38
NW	17	110	18.46	63	11.89
SE	11	102	16.89	107	20.19
SO	2	72	11.94	67	12.64
SW	10	88	14.65	91	17.17
Grand Total	**69**	**600**	**100**	**530**	**100**

4.5 Data entry and management

The survey data were entered in the software CSPRO 41 by a team of 10 trained data entry clerks, over a one-month period from March 21 to April 18 2013. Each of the ten enumerators had previously been trained by VNSO and employed to enter data for the Vanuatu Household Income and Expenditure Survey (VNSO 2013). However, a one-day data entry training session was held on March 20th 2013 at the offices of the VNSO to familiarize the clerks with the format of the current survey. The enumerators were trained on the data ranges of each of the sections of the survey, and each enumerator were asked to manually enter five surveys. These were reviewed for mistakes, and data entry proceeded. After each questionnaire was entered, it was scanned and filed.

The complete data file was reviewed during May 2013 to identify survey records containing incomplete or inconsistent data. In order to facilitate this process, the mean values and standard deviations were produced for every variable included in the analysis. Based on these values, some missing and inconsistent data were identified. These problems were resolved by confirming the data with the scanned copies of the surveys. The computer software Stata 12 was used to review and improve the data, construct the variables and implement all statistical analysis.

It was identified through this process that the 530 households contained in the survey sample were located in 52 of the possible 63 Enumeration Areas of Malekula Island. Given the small number of households in most villages on Malekula, many households included in the survey were the sole household from their village. The greatest number of households in any one Enumeration Area that was included in the survey sample was 16, whilst the fewest number was 3. As a result, the smallest unit of analysis used was Enumeration Area, rather than village.

4.6 Methods in data analysis

A number of statistical methods are used to analyse the data gathered for this study. These methods include: BW scaling analysis, a t-test, Tukey test, Latent Class (LC) cluster model, Probit regression analysis, and two-stage variance component estimation using the inverse Mills ratio treatment effect model. Each method is described below.

4.6.1 Best-Worst scaling analysis

Identifying what incentives motivated households to invest their labour in inter-household transfers is critical to gain insight into the utility derived by smallholders from this behavior. This information is critical for more accurately estimating their labour supply responses. This study uses the BW scaling analytical method to quantify the relative importance of 11 potential social and economic benefits identified as factors incentivizing smallholders to supply labour to inter-household transfers. These 11 factors were identified through a review of the literature, key informant interviews and the record keeping exercises discussed previously. The BW scaling analysis adapted the procedures as outlined in Lancsar and Louviere (2009) and Umberger et al. (2015).

The Balanced Incomplete Block Design (BIBD) method is used to ensure that each of the 11 factors is equally represented in the choice sets (Cohen 2009; Green 1974; Raghavarao 1971). Given a set of '*v'* attributes, '*b'* number of choice sets (block), '*r'* replications and 'λ' sets of pairs, a BIBD was expressed as (*b, r, k, λ*).

The data collected from the BW scaling was calculated to present individual scores (B_{ij}-W_{ij}) for all 11 motivating factors. The individual score values are obtained by adding the number of times each respondent (*i*) indicates a factor (*j*) as best (B_{ij}) and worst (W_{ij}), and subtracting the sum of times each attribute was selected as the worst from the sum of the best. Subsequently, a Standardized Interval Scale (SIS) is calculated by examining all respondent answers to the BW tasks and totaling respondents choices

for most and least important attributes to create two aggregate frequency values for each attribute: ‘best’ and ‘worst’.

The aggregate frequency values are the number of times each attribute is chosen as most important and the least important. The square root of the ‘best’ frequency value divided by the ‘worst’ frequency is calculated (SQRT/(B/W)) for each attribute. A scale is created with the attribute with the highest SQRT(B/W) becoming 100 (most important) and all other motivations are scaled relative to this motivation.

The results of this analysis are presented in Chapter 7.

4.6.2 Latent Class (LC) cluster model

The LC cluster model is undertaken to examine whether households can be segmented into several groups or clusters based on their stated motivation to supply labour to inter-household transfers (Chapter 7). Given presumed heterogeneity in the motivations expressed by the households in the sample, the LC cluster model seeks to classify households into a number of groups of unknown size, based on the identification of latent similarities in their responses (Vermunt and Magidson 2002). This method helps explain what household factors affect differences in the motivations to supply labour to inter-household transfers stated by respondents.

The LC cluster model is preferred to standard cluster analysis since it allows the use of independent variables (covariates) in order to better identify the characteristics of cluster membership and predict the future classification of households. The general

specification of the LC cluster model with the inclusion of covariates can be represented as follows (Vermunt and Magidson 2002):

$$f(\mathbf{y}_i|\mathbf{z}_i,\theta) = \sum_{k=1}^{K} \pi_{k|\mathbf{z}_i} \prod_{j=1}^{J} f_k(y_{ij}|\mathbf{z}_i,\theta_{jk}) \quad (1)$$

where *i* refers to an individual respondent; $\mathbf{y}$ denotes the vector of indicator variables; $\mathbf{z}$ is the covariate vector; θ is the parameter vector; K is the total number of clusters and *k* a particular indicator**;** $\pi_{k|\mathbf{z}_i}$ is a probability of belonging to cluster *k* given covariate values z_i; J is the total number of indicator variables and *j* a particular indicator; and y is the value of an indicator variable.

In this study, there are 11 household motivations included as indicator variables. The covariates include variables of household demographic characteristics, income sources, farm and household assets, labour allocation decisions, distance from markets and access to agricultural extension information and marketing support.

The results of this analysis are presented in Chapter 7.

4.6.3 Tukey test

The Tukey test, often called Tukey's honesty significant difference (HSD) method, is used in Chapter 7 to identify whether or not there is a significant difference of means among clusters. The Tukey test is a common post hoc test that is used by researchers to conduct multiple comparisons of mean values from all possible combinations, as well as to examine where the significant differences lie (e.g., cluster 1

versus 2, 3 and 4). The univariate test of variance (ANOVA) and multivariate analysis of variance (MANOVA) allow researchers to test differences of multiple group means, but they do not show where the means differ (Hair et al. 1995).

4.6.4 Probit regression analysis

Probit regression is used to analyze the relationship between a single dependent variable and explanatory variables. In this study, Probit regression analysis is performed to ascertain the correlation between the assignment of village labour to households, and their endowments, farm and non-farm assets, labour allocation behaviour and demographic characteristics (see Chapter 8). Household receipt of village labour is set as a dependent variable (y), while the household endowment and environmental variables identified in the literature review (Chapter 2) as having an influence on household labour supply responses are included as independent variables. These include: the size of household labour, farm and wealth assets; household access to external inputs of capital through remittances, bank loans and off-farm income; the estimated productivity of household labour, as evidenced by the age and education level of the household head; household access to farm extension advice or membership of a farmer organization; the distance of the household from the market (in Lakatoro); and information about the amount of labour households are expected to contribute to village group labour activities, by village authorities.

The Probit regression is also used in examining variables that influence household receipt of village labour. The regression analysis with a dependent variable y and k independent variables is expressed as (Koutsoyiannis 1977):

$$y = \beta_0 + \beta_1 x_1 + \beta_2 x_2 + \beta_3 x_3 + \ldots + \beta_k x_k + u \quad (1)$$

where x is a set of explanatory variable, β is beta coefficient and u is random factor or error term.

The results of this analysis are presented in Chapter 8.

4.6.5 The t-test analysis

This study uses the t-test to determine whether or not there is a difference between sample means of households which have and have not been assigned village labour with respect to the selected variables: labour and land endowment factors, household asset and income characteristics, distance from market, and access to inputs. This method helps to reduce uncertainty with regards to the findings of the probit regression analysis (see Chapters 8).

The hypotheses for the t-test are set as follows (Black 2010).

$$H_0 : \mu_1 - \mu_2 = 0 \quad (3.1)$$

$$H_1 : \mu_1 - \mu_2 \neq 0 \quad (3.2)$$

where H_0 is the null hypothesis and H_1 is the alternative hypothesis. μ_1 is the sample mean of group 1 and μ_2 is a sample mean of group 2. The null hypothesis is rejected if

the probability *p* value is equal to or less than a critical value set by the researcher (e.g., $\alpha = 0.05$).

4.6.6 Two-step estimator models

To eliminate the impact of the selection bias from the measurement of household labour supply responses to competing on and off-farm activities in Chapter 8, we use Heckman's (1976) two-stage estimation process of robust VCE (also called the Heckman selection-correction model) using an inverse Mills Ratio (IMR), in order to estimate the labour supply responses of households both receiving and not receiving the treatment, simultaneously. This uses the model:

L= f(H,V,P,Z,M)

where the household labour supply response (L) is the function of the household decision to maximize utility, given the impact of the household characteristics and endowments previously described (H), village factors (V) and preferences (P) to supply labour to competing farm and non-farm activities, considering the value of inputs of labour sourced from outside the household labour endowment: the assignment of village labour (Z) and the coefficient of labour inputs hired from the market (M). Given the segmentation of the sample into two household groups where the value of *Z* is 1 for households assigned village labour, and the value of Z is 0 for households not assigned labour by the village.

Where a positive outcome for the dependent variable is not observed in all cases, ordinary least squared (OLS) estimation will produce biased parameter estimates (Tobin 1958). Given both positive and negative values for a dependent variable, an IMR can be used to avoid possible selection bias, following the method proposed by Heckman (1976). A two-step, robust VCE is a simple method for the estimation of unknown variance; and therefore specifying a VCE (robust) OLS model of the two-step estimator, produces an estimated correlation results that are robust to errors that may result from heteroskedasticity.

This method enables this study to estimate the impact of the exogenous assignment of village labour on household labour supply responses to (1) food crop production; (2) cash crop production; (3) inter-household transfers; (4) off-farm employment; as well as (5) external inputs of market labour hired by the household.

4.7 Conclusion

As outlined in Chapter 1, this study measures the impact of inter-household transfers of resources on the labour supply responses of smallholder farming households on Malekula, in order to inform programs designed to facilitate the adoption of labour-led cocoa CCI. The aim of this chapter is to provide an overview of the research methodology which supports the investigation of the broad research objectives, including the process of questionnaire development, sample selection, fieldwork, data cleaning and entry; together with the analytical and empirical methods used to interpret the results of the data, in order to answer the research questions.

This chapter describes the three survey tools, and data analysis methods, used in this study. These tools and methods are used to collect and analyse empirical evidence of the social and economic incentives offered by cash crop production relative to food production, inter-household transfers and off-farm activities; and to quantify the impact of the assignment of supplementary village labour on household labour supply responses. This chapter presents and discusses the activities performed as part of the study fieldwork, including: the development and implementation of the 12 month field trial of CCI; the development of the household questionnaire, sample selection, the process of data entry and data cleaning; and the specific statistical tools utilized in data analysis for answering the key research questions.

The chapter explains that the questionnaire developed for this study was informed by a literature review of the factors that affect smallholder participation in cash crop markets; anthropological studies identifying social capital production as a key livelihoods strategy for many smallholder communities in Melanesia; together with key informant interviews and two diary keeping exercises; as well as previous investigations of the factors affecting smallholder cash crop production in Vanuatu and on Malekula. Subsequent scoping exercises were conducted to support the identification of key factors influencing the supply of labour to cash crop, food crop and social capital production. Semi-structured interviews with key informants - including smallholders, extension officers, cocoa and copra buyers, rural development agencies and public sector stakeholders – were integral to the development of this survey instrument.

The questionnaire was pre-tested and revised twice. The first pre-test was conducted by the study team, while the second pre-test was conducted on 480 households by the enumeration team. The revisions were made immediately after the pre-tests. The questionnaire gathered information on household characteristics, household and farm assets, land and labour endowments, labour supply rates to on-farm and off-farm activities, production practices, marketing practices, gift production practices and rates of supply of labour to inter-household transfers, and the best and worst factors motivating households to supply labour and gifts to inter-household transfers.

A random sample of households stratified by Area Council was developed to ensure that all geographic areas of Malekula Island were included in the survey. Subsequently, a household list of 600 households on Malekula was selected from the household list of 5896 households on Malekula that was developed as a result of the 2009 Vanuatu Population and Housing Census. The household sample therefore represented more than 10% of all households on Malekula, and more than 10% of all households in each of the 6 Area Councils. After survey implementation and data cleaning, this study utilized the responses of 530 households on Malekula. The survey data was tabulated in Stata 12.

The core data analyses operationalised for this study include the interpretation of descriptive statistics (see Chapter 5), as well as the interpretation of the results of the 12 month CCI trial (see Chapter 6) in order to identify household labour supply responses to improved incentives to produce cash crops. The BW scaling analysis is utilized to

identify the relative importance of the 11 motivational factors incentivizing households to allocate resources to inter-household transfers (see Chapter 7). The heterogeneity issues of respondents with respect to the 11 buyer attributes are examined by applying the LC cluster model (see Chapter 7). The Tukey test is used in order to identify whether there are significant differences of means among clusters or groups in the cluster analysis (see Chapter 7). A t-test is used to identify potential differences between households assigned village labour, and those not assigned village labour, with respect to specific socioeconomic information as well as farm characteristics (see Chapter 8). OLS regressions can assess the factors that determine the assignment of village labour to households (see Chapter 8). A robust two-stage estimator, using VCE and an IMR, is employed in Chapter 8 in order to simultaneously estimate the labour supply responses of households amongst both those assigned and not assigned and not supplementary labour, to competing farm and off-farm activities.

In the next chapter, the descriptive results of the survey are presented to discover the household characteristics of the sample population, and how these might contribute to the outcomes of the subsequent empirical analysis.

5. Description of Sample

5.1 Introduction

This chapter outlines the descriptive characteristics of the sample population. This chapter aims to increase our understanding of smallholder farming communities in Vanuatu or Pacific Island SIDS, and the household factors most important to predicting smallholder household labour supply responses in these communities, before proceeding to apply the methods of empirical analysis described in the previous chapter.

The chapter begins by presenting the mean smallholder household endowments of labour and education, followed by their mean landholding size, household assets, and farm input endowments. It then presents the mean value of income by source, and of expenditure by item; as well as the mean investmen of family labour (in hours per week) in on and off-farm activities.

The mean values presented in this chapter illustrate the significant labour supply constraints - relative to the size of their landholding - faced by households. This chapter also shows that only a small minority of household's possess land under freehold tenure, with most accessing land under tribal tenure - and therefore subject to the statutes of the tribal land tenure system, including the adjudication of disputes by local village authorities.

This chapter indicates that households dedicate an almost equal amount of labour to food and cash crop production, and that they supply a significant proportion of total family labour inputs to inter-household transfers. The chapter also indicates that

contributing labour to inter-household transfers is almost universal amongst the sample population – though only a minority of households had received an assignment of village labour in the previous 12 months. This indicates that this system is not motivated by balanced reciprocation, at least within the same calendar year. The motivations for households to invest household resources in inter-household transfers are explored in detail in Chapter 7.

In addition, whilst household expenditure on purchased items represented the single largest category of expenditure (noting that the survey results exclude the value of expenditure on subsistence food), the second largest source of expenditure is on gifts of cash and food to church and other families. This indicates the extremely high level of demand that inter-household transfers places on smallholder resources.

Whilst households derive the majority of cash income from sales of cash crops, this chapter shows that a minority of households access income from off-farm employment, and that they enjoy higher total income levels as a result. This indicates that households would be highly motivated to obtain off-farm employment to supplement farm income. The relative returns to labour offered by cash crop production under current conditions, and intensified methods, is presented in the next Chapter (6); while households' comparative labour supply responses to the four main competing activities – food crop production, cash crop production, inter-household transfers and off-farm employment - is investigated further in Chapter 8.

5.2 Household characteristics

Previous studies examine the relationship between resource endowments and the supply of labour to on-farm activities by smallholder households, including: the size of the household labour endowment (Fafchamps 1992; Ellis 1981); the age of household labour (Benjamin 1992; Goetz 1992); the size of household land endowment (Diagne 1998; Fafchamps 1992; Jayne et al. 2003); the tenure under which land is held (De Soto 2000; Hayes et al. 1997; Ondige 1996); access to productivity enhancing inputs (Birkhauser et al. 1991; Fan, Hazell, and Thorat 1999; Kelly et al. 2003;), access to bank credit (Eswaran and Kotwal 1986; 1990; Binswanger et al. 1993; Sadoulet and de Janvry 1995); human capital levels (Cook 1999; Fachamps and Quisumbing 1998; Foster and Rosenweig 1996); and the distance of the household from market (Binswanger and Rosenzweig 1986; 1993; Key, Saudolet, and de Janvry 2000; Minten and Kyle 1999; Obare et al. 2003; Omamo 1998; 1998a).

Previous studies indicate that smallholder household labour supply responses are heavily influenced by risk, and therefore households are incentivised to allocate time to a multiplicity of activities, both on and off-farm (Binswanger 1980; von Braun and Pandya-Lorch 1991; Reardon, Delgado, and Matlon 1992), as a result of missing markets for labour and land, and poor linkages to output markets (de Janvry et al. 1991; Donnelan and Hennessy 2012; Sadoulet and de Janvry 1995; Singh and Strauss 1986; Taylor and Adelman 2003; Kuroda and Yotopoulos 1978).

Past investigations of smallholder responses to input and output market failure indicates that smallholders commonly invest resources in inter-household transfers to

shift surplus inputs (like land and labour) and outputs (like food) to deficit households, in return for future like reciprocation (de Janvry and Sadoulet 2001; de Janvry and Sadoulet 2006; Dyer et al. 2001; Ellis 1993; Eswaran and Kotwal 1986; Fafchamps 1992; Key et al. 2000; Sadoulet et al. 1998). The evidence from PICs indicates that smallholders invest significant resources in inter-household transfers (Gregory 1982; Macpherson 1994; Sahlins 1963) however it is not clear whether these transfers are motivated by like reciprocation, or some other mechanism (Huffman 2005; McGregor and Hopa 2007). However there is some agreement that these transfers have a significant impact on the availability of household labour for investment in other on and off-farm activities (McGregor and Hopa 2007; Weightman 1989; Welegtabit and Longmore 2009).

This chapter presents the descriptive data from the survey to provide context for the analysis of findings in Chapters 6, 7 and 8.

5.3 Household labour and education endowments

The means and standard deviations of the sample household demographic and geographic characteristics are presented in Table 5.1. The factors measured include the number of individuals in the household, age of the household head, education level of the household head, the number of dependents in the household (<15 years and >65 years), the size of the household's labour endowment, and the distance of the household from the final cash crop market on the island (Liltzlitz wharf).

Table 5.1: Household labour and education endowments

Indicator (n=530)	Mean	Standard deviation
Household size (count)	4.4	2.2
Household labour endowment (count)	2.6	1.7
Household dependents (count)	1.3	1.4
Household members usually (9 months p.a.) absent (count)	0.5	1.4
Age of household head (years)	46.9	13.3
Household head education (years)	6.8	2.6
Distance of the household from wharf (km)	25.3	14.2

Source: author's survey

The size of the household labour endowment is often a critical factor influencing smallholder responses to on and off-farm activities (Benjamin 1992; Ellis 1981; Fafchamps 1992 Jacoby 1993; de Janvry et al. 1991). The measure of household size presented in Table 5.1 refers to the total number of individuals who were present in the household during the time of the survey. It includes adult and juvenile members of any age, and those who are ordinarily part of the household, but who might not have been present during the full 12 months prior to the survey. By this measure, the average household size of the sample population was 4.4 members, with a standard

differentiation of 2.2. This is marginally less than the national average household size, and average rural household size, of 4.8 members, as recorded in the 2009 National Population and Housing Census (VNSO 2009). However the standard deviation rate indicates that there is significant variation in household size amongst the sample population.

However, the average sample household labour endowment, which is equivalent to 2.6 persons with a standard deviation of 1.7 persons, is a more accurate measure of the potential labour supply available to the household. The household labour endowment represents the total number of individuals present in the household for at least 3 of the last 12 months, and who were aged over 15 and below 65. This method ensures a more accurate estimate of the total volume of labour inputs that can be supplied by a household over a 12 month period. It excludes children and age-dependent members of the household who are not responsible for, or fully committed to, the income and other livelihood generating activities of the household; and therefore from being considered part of the labour force of the household (Cook 1999). The value for each household's labour endowment was calculated by subtracting the value of two other variables presented in Table 5.1 – household dependents and household members not present for 9 or more months – from the mean value given for household size in Table 5.1.

The age and education level of the household head are additional factors influencing on and off-farm labour decisions (Benjamin 1992; Fachamps and Quisumbing 1998; Foster and Rosenweig 1996). Households headed by individuals

aged over 55, and with a large number of children aged under 15 and adults aged over 65, may shift labour inputs to home care (Benjamin 1992; Cook 1999; Evenson 1978).

An increase in the level of education of the farm household head can increase the productivity of farm labour by improving efficiency in the allocation of household labour, and the adoption of new labour productivity enhancing technologies (Foster and Rosenweig 1996; Lockheed 1980; Ram 1980; Schultz 1975) or by facilitating an increase in the returns to off-farm labour (Fachamps and Quisumbing 1998), which can in turn discourage household labour from engaging in farm production activities, as a result of raising wage expectations (Lopez 1984).

Table 5.1 reveals that the average age of the heads of households included in the sample population was 46.9 years, with a standard deviation of 13.3 years. This result indicates that the average head of household is well below the age after which returns to agricultural labour are expected to begin to decline: 55 years (Benjamin 1992).

The average number of years of schooling heads of households have obtained as is 6.8 years, with a standard deviation of more than 2.5 years (Table 5.1). Table 5.1 indicates that head households have obtained, on average, at least some initial secondary schooling; though this result indicates that none of the sample population has completed secondary school or participated in tertiary education, within a standard deviation from the mean. This may have an impact on the capacity of many of the heads of households in the sample to adopt new crop production efficiency enhancing technologies critical to increasing the returns to on-farm labour, or move household

labour into off-farm income generating opportunities, due to the importance of education as pathways to these two outcomes.

The physical distance of smallholder households from input and output markets has a critical impact on their incentives to allocate household labour to market production activities. High transport costs lead households to derive a higher proportion of household income from consumption of own food produce the further they are from market, because of the additional marketing costs associated with input and output markets, leading small-holder households located long distances from markets, or with poor access to marketing infrastructure, to undersupply labour to cash crop production (Key, Saudolet, and de Janvry 2000; Minten and Kyle 1999; Obare et al. 2003; Omamo 1998; 1998a; Stifel et al. 2003).

Table 5.1 presents information on the mean distance that households are located from the main cash crop market on Malekula, at Litzlitz wharf. Given that all cash crops, such as copra and cocoa, are shipped to another island in the Vanuatu archipelago for export (Espiritu Santos), all smallholder produced cash crops reach Litzlitz wharf as a final point prior to transportation off the island (though at least one plantation utilises its own wharf and shipping facilities to transport its product off island). While the point of sale may be at the farm gate or at an intermediate point between the household and Litzlitz wharf, the costs of transporting their produce this distance is deducted from the final sale price. Thus, the distance of the household from Litlitz wharf is a good proxy measure of the marketing costs faced by the household, and the impact of these costs on

the returns to cash crop labour enjoyed by the household, and therefore their incentive to supply labour to cash crop production.

Households are located, on average, more than 25 kilometres away from Litzlitz wharf, with a standard deviation of more than 14 kilometres. This indicates that the average household faces considerable cash crop marketing costs. Variation in distance from market impacts on the returns to labour provided by cash crop production, which is explored in Table 5.3. As a result, households may face incentives to supply labour to other activities other than market oriented ones, such as food crop production and inter-household transfers.

5.4 Household farm input endowments

In addition to the household labour endowment and physical proximity to markets, large endowments of farm inputs such as cash crop land resources, and of productivity enhancing farm inputs such as chainsaws and wheelbarrows, incentivize households to supply more labour inputs to on-farm productive activities by either raising the returns to on-farm labour (e.g. Hayami and Ruttan 1971), or by enabling households to dedicate more of their land resources to cash crop production (e.g. Fafchamps 1992).

The productivity of agricultural labour is raised as a result of accessing training or information on the use farm labour or productivity enhancing inputs more efficiently, often provided by public farm extension programs (Birkhauser, et al. 1991) or by farmer co-operatives (Anderson and Feder 2004). In addition, households are incentivized to

invest more labour in developing their cash crop production resources, when they have access to institutions which effectively reduce the transaction costs involved in determining ownership and accessing to land (Johnson 1972). Non-private tenure systems, such as communal and tribal systems, can encourage households to divert resources from farm production to other activities in order to defend their property rights, and improve the security of the household (Berry 1989; Otsukaa et al. 2001).

The means and standard deviations of the sample households' farm input endowments are presented in Table 5.2. The variables presented in Table 5.2 include: the size of household landholding, number of cocoa trees, number of copra trees, whether or not the household has increased the size of their landholding in last 5 years; whether or not any of their land is held under freehold tenure; whether they are a member of a farm co-operative; whether the household has had access to agricultural extension advice in the last 12 months; and whether anyone in the household is in possession of a number of assets important to agricultural production and marketing: a mobile phone, a generator, a wheelbarrow, a chainsaw and a tree pruning saw.

Table 5.2: Household farm assets

Indicator (n=530)	Mean	Standard deviation
Cropland operated by household (hectares)	4.9	5.7
Plots held under freehold tenure (%)	13.2	33.9
Cocoa trees (number)	539.5	613.6
Coconut palms (number)	673.0	812.3
Increase in the size of landholding last 5 years (%)	14.0	34.7
HH accessed extension advice last 12 months (%)	16.4	37.1

HH is member of a farm co-operative (%)	23.2	42.3
Mobile phone (%)	86.6	34.6
Wheelbarrow (%)	42.8	49.5
Generator (%)	33.2	47.1
Chainsaw (%)	11.7	32.2
Pruning saw (%)	4.2	20.0

Source: author's survey

Table 5.2 indicates that while households maintain access to an average of almost 5 hectares of land, there is significant variation in the size of landholdings maintained by households – with households accessing up to 5.7 hectares more land within one standard deviation. Households in the sample population managed, on average, 539 cocoa trees and 673 coconut palms, with significant variation in these numbers amongst households, given the size of the standard deviations.

The results for the size of the landholding presented in Table 5.2 have been calculated using the most accurate method that could be devised for approximating the size of the landholdings amongst households in the sample population. During pre-testing the household questionnaire, respondents were routinely unable to quantify the actual size of their land in metric or imperial land area units, such as hectares or acres. Likewise, the most recent Vanuatu Agricultural Census (VNSO 2007) did not offer information on the average size of landholdings, instead using the number of tree crops and other plantings to offer an indication of the size of a farmer's agricultural holding.

In the absence of the field resources to physically measure the land area of each household's holding, this study approximated the size of the respondents landholding, by converting the total number of tree crops (cocoa and coconut) maintained by the household, into a land area figure: using the recommended number of tree crops (cocoa and copra) that should be planted per hectare utilizing standard spacing, provided by DARD's extension team in Vanuatu. This figure equated to 1100 cocoa trees, and 150 coconut palms, per hectare.

Table 5.2 indicates that only 13% of the plots of land maintained by households were held under freehold tenure. In the questionnaire, households were asked to identify the system of land tenure under which their plots of cash crop plots were managed: private tenure, communal, private tribal or some other system. This question revealed that 87% of the tree cash crop land managed by households in the sample, was under 'private tribal' land, and 13% under freehold. Private tribal land tenure is the result of the household having managed to successfully lay an exclusive claim to land legally owned by the tribal group, through the use of planting of tree crops.

Table 5.2 indicates that 13% of households currently have access to some land that is held under private land tenure. This figure should not be misinterpreted as meaning 13% of land is under private tenure. Despite the relatively small proportion of households with access to private land tenure, this is a significant result and indicates that private land tenure has had some significant inroads since Independence (when nominally 100% of land was converted to tribal land tenure), and the reversion of all agricultural land to tribal systems of tenure.

Table 5.2 also indicates that only a relatively small proportion (14%) of households, have increased their landholding size in the last 5 years. The most common method for transferring land between households was inheritance from family members: in more than 79% of cases. Transfers of land between households in return for payments represented only 9% of all cases. Only 4% of households had increased the size of their landholding in the last 5 years as a result of the settlement of a land dispute – the same proportion of those who gained land belonging to absent family members.

Table 5.2 indicates that households were more likely to possess wealth assets than farm productivity enhancing assets: 86% possess at least one mobile phone and 33% possess at least one generator; yet only 11% of households possessed a chainsaw and just more than 4% possessed a pruning saw; though almost half (42%) possess at least one wheelbarrow. The higher figure for a chainsaw compared to a pruning saw, despite the higher price, reflects the multi-functionality of a chainsaw (i.e. for preparing timber construction materials), as well as the poor availability of pruning saws on the island. Similarly, the relatively high figure obtained for the wheelbarrow probably also reflects the multi-functionality of this tool for agricultural production and other activities. A pruning saw, in contrast, has a relatively specific purpose on Malekula: cocoa tree management.

These three farm inputs (chainsaws, pruning saws and wheelbarrows) were used to build a composite 'farm asset index' in order to indicate each household's farm asset endowment level, for use in in the statistical analyses in subsequent chapters in this thesis. Two wealth assets (mobile phone and a generator) were used to build a

composite ‘household wealth asset index’ in order indicate each household’s wealth asset endowment, similarly for use in the statistical analysis in later chapters.

Table 5.2 indicates that a relatively small number of households accessed farm extension advice in the last 12 months – just 16% – while more than 23% of households were members of farm co-operatives. These figures do not indicate the qualitative impact of farm extension advice or farm co-operative membership: specifically, whether they do contribute to improving the productivity of agricultural labour or provide any group marketing benefits important to reducing the transaction costs associated with selling to cash crop markets. Given that local retail outlets managed by one or a small number of members of the community are commonly known as ‘co-operatives’, there may have been some confusion by respondents between membership of farmer co-operatives and other community co-operatives.

5.5 Household labour supply responses

Table 5.1 revealed the mean household labour endowment, including the mean number of labour inputs available to each household and how these are allocated. This includes the number of person days the household supplied to food crop production, cash crop production and inter-household transfers in the last 12 months. Table 5.3 also provides a mean figure and standard deviation for the total number of non-household inputs of labour the household was provided, either by hiring labour from the market; or assigned to the household by village authorities. Finally, Table 5.3 provides a figure for

the number of person days of labour households are expected to contribute to inter-household transfers every year.

To calculate the labour supply values expressed in Table 5.3, the survey instrument asked heads of households to identify the total number of hours that each household member allocated to cash crop production, food crop production and to inter-household transfers every week in order to calculate an annual number of person days: considered to be equivalent to 8 hours of labour.

To calculate the number of person days of labour expected of each household by the village authorities, this study sought to identify how many days (and half-days) of group labour activities each household in their village were commonly expected to attend, every week. Households were asked whether members of their village were expected to contribute labour to a series of named group labour days that were identified through key informant interviews and pre-testing. These included Chief's Day, Youth Day, Women's Day, Co-operative Day and any other group labour days not specifically named. In each instance where the household answered yes, they were asked a follow-up question which sought to identify if that activity was commonly a commitment of an entire person day, or just half a day. Using this information, a value for the total number of (whole and half) person days of labour commonly expected of households in their village, was attributed to each household.

A series of labour activity questions was included in the questionnaire, which enabled the calculation of the total value of person days of village labour assigned to the household, and the total person days of labour hired by the household from market

sources. Each household was asked to describe how many person days of non-household labour they accessed, for each month of the year. Respondents were asked to answer what type of activity that labour was involved in (whether cash or food crop) and what the source of the labour was: whether hired market labour, or unpaid village labour. This method enabled the study to calculate a total number of person days of non-family labour accessed by the household for the last 12 months, and whether that labour was hired, or assigned to the household through the village inter-household labour transfer mechanism.

Table 5.3: Household labour supply responses

Indicator (n=530)	Mean	Standard deviation
Labour for cash crop production (days/year)	157.8	187.3
Labour for food crop production (days/year)	159.2	291.8
Labour provided to village (days/year)	80.2	81.8
Total household labour supply (days/year)	397.2	434.2
Labour expected by village (days/year)	90.6	45.8
Village labour provided to hh (days/year)	10.2	30.6
Households providing labour to village (%)	89.4	30.7
Households assigned village labour (%)	27.5	47.7
Market labour hired by hh (days/year)	3.8	13.6
Households accessing hired labour (%)	16.0	36.7

Source: author's survey

Table 5.3 indicates that an average household labour endowment amounted to 397 person days per year. On average, 39% of these (or 157 person days) are supplied

to cash crop production; while over 40% (159 person days) is supplied to food crop production activities. The remaining 20% (80 person days) is supplied to village inter-household transfers. These transfers, previously described in Chapter 3, include household labour directed to maintain village infrastructure and meeting spaces, as well as provide supplementary labour to private households, by village authorities.

Table 5.3 also reveals that almost all households did contribute labour to inter-household transfers, in far greater quantities than they were assigned. Around 89% of households contributed some family labour throughout the last 12 months. While households contributed on average more than 80 person days to these activities - or more than 1.5 days per week – they were assigned, on average, only 10 person days of village labour a year. Despite this, households were expected to contribute 90 person days per year, on average, by village authorities.

Table 5.3 indicates that more households were assigned village labour than hired labour. Indeed, the mean number of person days of labour hired by households per year, amounted to only 3.7 person days. On average, only 16% of households managed to access hired labour in the last twelve months. However, Table 5.3 also reveals that 27.5% were assigned village labour in the last twelve months. This result indicates that the assignment of village labour is, by comparison, a far more important source of supplementary agricultural labour than rural labour markets.

Table 5.3 reveals that the standard deviation in the number of person days of village labour assigned to households is almost three times the value of the mean – 30.5 person days, compared to 10.2 – indicating that there is significant variation in the

number of days assigned by village authorities to households. The reasons for this variation and limited number of households assigned village labour will be explored in greater detail in subsequent chapters.

5.6 Household income sources

The total value of income earned by each household in the last twelve months provides some indication of the level of their engagement in markets, including cash crop markets. Whilst Chapter 3 indicates that off-farm income has become an increasingly important source of income amongst Malekula's households, it also reveals that on-farm activities – including cash crops (copra, cocoa and kava) and the sale of vegetables and livestock products – continue to provide the largest share of household income. Remittances have been found to provide an important additional source of income and investment capital for rural households. Ownership of bank accounts is indicated, as well as access to loans.

Poor access to credit and bank accounts has a negative impact on income from, and labour invested in, agricultural production (Deaton 1989; Eswaran and Kotwal 1986; 1990; Binswanger et al. 1993; Sadoulet and de Janvry 1995). Access to credit enables a household to purchase inputs important to increasing the productivity of agricultural labour and land (Delgado 1995; Feder et al. 1990). Given that agricultural production typically involves a period of several months between the time that inputs are purchased and the time the output is marketed, access to working capital (and hence

access to the credit market) is an important factor in determining household income levels amongst farmers utilizing purchased inputs (Eswaran and Kotwal 1986; Deaton 1989; Sadoulet and de Janvry 1995).

Remittances have been found to replace missing investment capital in enabling farm households to overcome credit and risk constraints to investing in commercial agricultural production (Adams 1998; Arizpe 1981; Wiest 1979; Stark 1991; Taylor et al. 2003) or help overcome consumption constraints (Ahlburg 1981; Brown and Ahlburg 1999; Lipton 1980; Masey et al. 1987). Empirical research demonstrates the enabling role that remittances play in facilitating the diversification of household income generation into off-farm activities (Barrett et al. 2001; Reardon et al. 1992; Reardon 1997).

The means and standard deviations of sample household sources of income are presented in Table 5.4. This includes income from the cash crops: copra, cocoa and kava; income from sales of vegetables and livestock; and income from remittances and off-farm earnings. It also includes information on whether the household has a bank account or has accessed a bank loan in the last 5 years.

Household income levels were calculated by asking households to indicate how much cash income they had derived over the last 12 months from sales of each of a long list of agricultural products, as well as from salaries and transfers from other households, for each of the items listed in Table 5.4. The total value of household income presented in Table 5.4 therefore significantly underrepresents the true value of

household income, by failing to capture the value of own produced food consumed by the household.

Table 5.4: Household income and credit sources

Indicator (n=530)	Mean	Standard deviation
Vegetables (1000 Vatu/year)	10.1	21.3
Livestock (1000 Vatu/year)	14.6	33.4
Cocoa (1000 Vatu/year)	64.0	87.0
HH has cocoa income (%)	89.0	31.2
Copra (1000 Vatu/year)	55.9	97.4
HH has copra income (%)	83.2	37.4
Kava (1000 Vatu/year)	34.5	62.1
All cash crops (1000 Vatu/year)	154.4	174.1
Remittances (1000 Vatu/year)	14.7	35.5
HH has remittance income (%)	33.9	47.4
Off-farm income (1000 Vatu/year)	82.3	270.2
HH has off-farm income (%)	26.2	44.0
Total Household income (1000 Vatu/year)	323.5	410.2
HH member has a bank account (%)	65.9	47.5
HH access a bank loan (%)	11.9	32.4

Source: author's survey

Table 5.4 indicates that the mean household annual income amongst the sample population was 323,480 Vatu (US$3,375 at current exchange rates[1]) per household, per year. Table 5.4 also reveals that households are more dependent upon cash crops to derive that income. Indeed, cash crops contribute just under half of household cash income amongst the sample population, with cocoa providing the largest proportion of household cash income, at a mean of 63,980 Vatu (US$613); and with 89% of all the households in the sample reporting that they received income from this activity in the last twelve months.

The cash income derived from copra is 55,908 Vatu per year (US$532). More than 83% of households in the sample indicate that they received income from this activity in the last twelve months. Kava and non-cash crop agricultural income – livestock and vegetables – also provide an important source of income. However, the single most important source of income, for the limited number of households which can access it, is off-farm earnings: providing those households 82,290 Vatu (US$858) each year, on average. The standard deviation for this category income, at 270,240 Vatu or 328% of the value of the mean, indicates that there is significant variation in the level of income that households derive from this source, with a small number of households deriving large amounts from off-farm income, driving up the mean for all households. In addition, the relatively low number of households that derive an income from this

[1] This study uses the exchange rate of Vatu per 1 US dollar = 95.8396 provided by XE Rates on 15/09/2014 (xe.com/currencyconverter/ convert/?Amount=1&From=VUV&To=USD)

activity compared to cash cropping – just over 26%, as compared to well over 80% for both copra and cocoa – provides further evidence that the mean value for this activity (Table 5.5), may be the result of the extremely high levels of income derived from this source by a small number of households,.

The 2011 Household Income and Expenditure Survey implemented by the Vanuatu National Statistics Office, indicates that rural households derive 39% of their income from subsistence sources, and that this figure is 40 % among households on Malekula (VNSO 2011). If we use this ratio, then the average subsistence income of households in our sample is 215,653 Vatu (US$2250), on top of the average total income figure revealed in Table 5.4 (323,480 Vatu or US$3375). This would bring the total average income level of households in the sample population to 539,133 Vatu (US$5625).

Dividing this total by the mean number of household members reported in Table 5.1, indicates that the per capita income of households in our sample is to 122,133 Vatu (US$1274) - a figure equivalent to 40% of the mean National per capita income level reported by the World Bank (2014): US$3,182. This indicates that our sample of rural households lives well below the mean level of national earnings. This result also indicate that subsistence income, rather than cash crops, remains the most important source of income for households in our sample population; and that households in the sample retain a significant incentive to continue to supply sufficient and supplementary labour to this economic activity.

Table 5.4 also indicates that the majority of households (66%) had at least one member with a bank account, at the time of asking. Table 5.4 also shows that 12% of households either had an outstanding bank loan, or has accessed a bank loan in the last 5 years. Despite the presence of only one bank branch on the island of Malekula, Table 5.4 illustrates households have been able to access a minimum level of financial services. The questionnaire did not ask households to identify the purpose of the bank loan, and therefore whether it had been used to invest in developing their agricultural enterprises.

5.7 Household expenditure items

The means and standard deviations of the sample household expenditure items are presented in Table 5.5. This includes expenditure on school fees and related items; purchased consumer goods, including food; transport; and gifts to other households.

Table 5.5: Household expenditure items

Indicator (n=530)	Mean	Standard deviation
School fees and materials (1000 Vatu/year)	30.94	57.88
Purchased consumption goods (1000 Vatu/year)	46.09	55.35
Transport (1000 Vatu/year)	12.76	16.97
Gifts (1000 Vatu/year)	32.57	47.087
Total expenditure (1000 Vatu/year)	120.02	117.18

Source: author's survey

The questionnaire asked households to nominate the value of their expenditure on a set number of expense categories over the last 12 months. The questionnaire aimed to include the full range of potential expenses, using the results of the 2011 Household Income and Expenditure Survey (HIES) for reference as well as pre-testing. However, the questionnaire focused mainly on the major expense categories.

The results presented in Table 5.5 show that expenditure on purchased goods in the most important category, followed by expenditure on gifts, then facilitating their children's participation in school, and finally transport costs.

Households were asked to value their total expenditure on a range of consumables, from household material goods (kerosene, soap, etc), to household food items goods (salt, sugar, flour and purchased prepared foodstuffs) as well as clothing and other items, for the last 12 months. The aggregated value for these expenditure items is presented as 'purchased consumption goods' in Table 5.5.

In pre-testing, households identified that expenses associated with their children's participation in school (fees, text books and writing materials, shoes and uniforms, bedding, transport costs) and so these combined costs are presented as'school fees and materials' in Table 5.5.

Households were asked to estimate their annual expenditure on transport, given that this had been identified as a rising category of expenditure in pre-testing. This was obviously a difficult proposition, and so households were subsequently asked to identify only the amount expended on passenger transport costs, such as the cost of travelling to local and municipal town centres to purchase and engage in sales of goods. Thus the

figure for transport costs included in Table 5.5 does not include freight costs, given cash crops are often sold at the farm gate and the freight cost is already incorporated into the price paid by the buyer (farm gate price).

The cost of providing gifts to other households was also identified in pre-testing, as well as in the literature, as a major category of expenditure for many rural households in Vanuatu, and Malekula. Anthropologists have identified that customary inter-household transfers of labour and food resources are a feature of rural life in Vanuatu and a central dynamic of social status differentiation in tribal society (Allen 1980; Blackwood 1981; Huffman 2005). These findings reflect the wider investigation of the role of gifts in economic competition and social stratification in other Melanesian societies (Gregory 1982; Sahlins 1963; 1972; Weiner 1992). In addition, they also reflect the investigation of the network and other benefits provided by the investment of household resources in social capital development (Coleman 1988; Fafchamps and Minten 1999; Portman 1998; Putnam 1993).

To capture information on the value of household expenditure on the range of different cash and consumption goods identified as potential gifts, households were asked to provide an indication of the value of cash and in-kind gifts given to non-household members at a large number of potential social and cultural occasions, including: weddings, funerals, peace settlements, nimangi ‘grading’ ceremonies, and circumcision ceremonies. The value of labour provided in support of social or cultural activities was not included as a gift. Similarly, remittances were not included as a gift expenditure activity. Thus, this category of expenditure focused on capturing the value

of the various in-cash and in-kind transfers made between households within a tribal network.

The mean value of household expenditure on gifts, as a proportion of all expenditure reported, was 32,570 Vatu (US$340) or 27% of total expenditure. The figure offered by the 2011 Vanuatu Household Income and Expenditure Survey (HIES) indicate that gifts expenditure represents just under 5% of total expenditure amongst households on Malekula Island. The much higher rate of expenditure by study sample households may be the result of the more comprehensive list of expenditure items regarded as 'gifts,' included in this questionnaire (14 separate categories) compared to the HIES methodology.

5.8 Conclusion

This chapter presents descriptive analysis of the sample smallholder households on Malekula to identify the household labour supply responses to incentives in cash crop markets.

The results presented in this chapter indicate that households in the sample population are severely labour constrained, depending almost exclusively on family labour to manage nearly 5 hectares of land of cash crops (largely copra plantations), in addition to supplying labour to subsistence food cropping responsibilities, off-farm income generating activities, and inter-household transfers. Households have not been successful, or perhaps have lacked incentives, to increase the size of their landholdings in the last five years, given the size of their existing landholdings and their inability

access supplementary land or labour via the market. A select group of households numbering almost a third of the total has been assigned non-family labour by village authorities in the past 12 months.

Food crop production represents the most important activity amongst households, attracting the most family labour and – it is imputed – contributing the largest amount of family income. Cash crop production is of secondary importance, attracting marginally less labour and contributing slightly lower income than food crop production. Cocoa is the most important cash crop activity, given the income derived from it, followed by copra. Off-farm income provides the single largest source of cash income to a minority of household – though the standard deviation for this item indicates a huge amount of variation in the total value of off-farm income earned.

The relatively low rate of engagement with cash crop markets may be the combined result (among other factors) of households in the sample being located in areas very distant from cash crop markets, managed by heads of households with relatively little secondary education, or poor access to extension training, farmer co-operatives, labour saving inputs and bank credit – though the possession of modern communication tools such as mobile phones, was widespread among households; and possession of bank accounts is relatively common. Engagement with cash crop markets may also be limited by the large proportion of labour households were obliged to contribute to inter-household transfers.

Households indicated that they invested labour, food and cash in inter-household transfers, with the total cost of household expenditure on these items exceeding the costs of educating their children, as well as the transport costs faced by the family.

The results here can help us understand the potential constraints on labour-led CCI (see Chapter 6), as well as farmer attitudes towards the potential rewards derived from committing labour and material resources to inter-household transfers (see Chapter 7), and how households utilise the supplementary labour resources assigned to them by the village in order to maximize their household income levels (see Chapter 8). The next chapter uses the Case Study method in order to further explore the labour supply responses of smallholder households on Malkeula. The following chapters apply more rigoruous empirical methods to identify the impact of inter-household transfers on farmer motivations and and labour supply responses.

6. Cocoa management methods and labour supply responses of smallholder farmers on Malekula Island, Vanuatu

6.1 Introduction

This chapter investigates the subsidiary research question: 'Do households in the sample population adopt cocoa CCI in response to increased returns to labour?' In order to answer this research question, the analysis examines the relative returns to labour offered by competing cash crop production activities – principally copra production – and the imputed returns to labour offered by inter-household transfers. This chapter also presents the returns to labour offered by cocoa production under different scenarios of labour input intensity, gathered via a 12-month field research project comparing the returns to labour offered by a cocoa CCI-related production method: Integrated Pest and Disease Management (IPDM) of cocoa - with current practice. It subsequently identifies, through the use of an exit survey, the proportion of smallholders who identified that they would adopt IPDM, following their participation in a one-year trial. The field research and exit survey involved 72 cocoa-farmers from Malekula who were specifically selected for their commitment to cocoa production, as evidenced by membership of six of the largest cocoa marketing co-operatives. The results of the survey indicated that only a minority of participants in the trial were willing to adopt IPDM for their entire cocoa sub-holding. The large additional labour commitment this would entail was a key factor in farmers' decision not to adopt. Farmers who did not adopt identified that they were too busy with other cash crops and inter-household

transfers to dedicate the additional time required by this method – but that an increase in the price of cocoa might motivate their future adoption. This indicates that methods to increase farm gate prices through improved access to niche markets offering higher prices, might be important to increasing adoption; or that social learning, once the higher returns to labour and incomes derived from cocoa IPDM are demonstrated by early adopters in the community, might facilitate subsequent adoption.

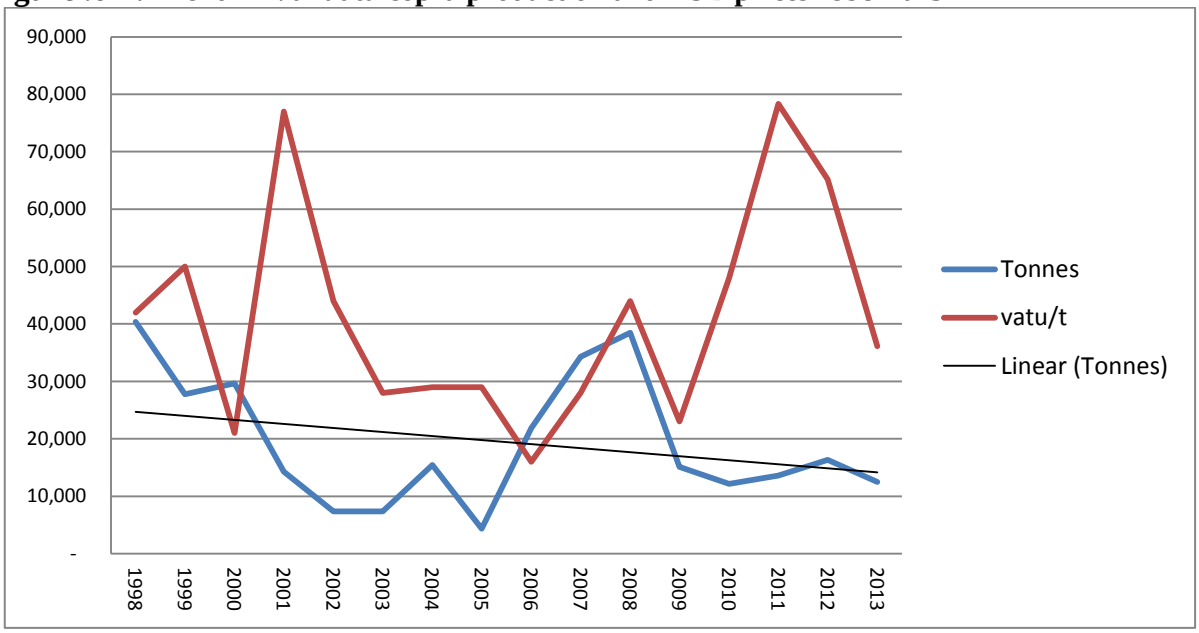
6.2 Background on cash crop production in Vanuatu

Smallholders in Vanuatu commonly face a range of risk factors which combine to reduce their incentives to allocate additional resources to cash crop production, including: i) low farm gate prices as a result of high rate of transaction costs imposed by long distances to marke, coupled with inefficient transport and transshipment infrastructure (ADB 2011; World Bank 2014); ii) high rates of exposure to frequent natural disasters, such as cyclones, which commonly result in crop failure (World Bank 2009); iii) a customary land tenure system which results in frequent disputes as a result of uncertainty over title (AusAID 2008; Tacconi 1991; Malavatumauri 2013); iv) the social obligation that smalholder households on customary land, divert a significant proportion of their household labour resources towards inter-household transfers of gifts and labour (Allen 1981; Blackwood 1981; Huffman 2008; McGregor and Hopa 2007; Weightman 1989). However other factors – such as the low rate of adoption of efficiency enhancing agriculture production methods and inputs, which results in low yields – are also important in explaining the persistent low rates of income from cash

crops (ACIAR 2012; VNSO 2012). Farming systems in Vanuatu use few purchased inputs, relying on land, labour and hand tools, and suffer from high rates of pre-harvest losses to pests and diseases (ACIAR 2009; VNSO 2007; 2010; Weightman 1989).Falling world market prices for the cash crop commodity traditionally most important to smallholder income – copra – have been described as the principal reason for a decline in income from cash crops over the past decade (McGregor and Hopa 2007; VNSO 2013).

Copra is a popular crop among rural households because it is a 'flexi-time' crop which requires relatively little labour for harvesting or management, and can survive long delays in the marketing chain (Weightman 1989; McGregor and Hopa 2007). Most households produce copra at times of peak demand for income, such as the payment of schools fees in January and February, when income from other crops is not readily available (Cordelier 2006). However declining world prices for, and therefore household income from, copra has begun to discourage production of this crop among smallholders (Figure 6.1).

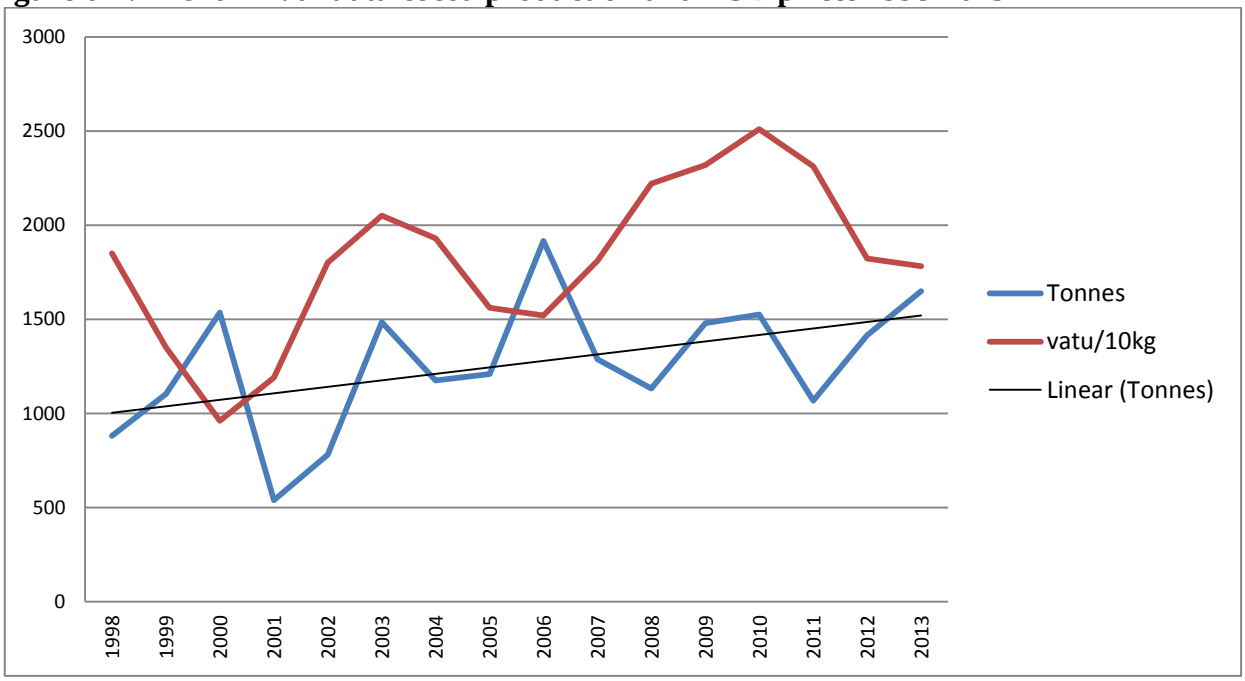
Figure .6-1: Trend in Vanuatu copra production and FOB prices 1998-2013



Source: VNSO 1983; VNSO 1994; VNSO 2007; VNSO 2011

The Government of Vanuatu has sought to arrest this decline by assisting households to shift into alternative cash crops, such as cocoa; and to adopt more intensive forms of production which would improve yields (DARD 2009). The rising trend in world cocoa prices (Figure 6.2) and increasing demand for specialty cocoas (TCC 2012), have been cited as reasons for smallholders in Vanuatu to invest additional household resources in cocoa production (ACIAR 2009).

Figure 6-2: Trend in Vanuatu cocoa production and FOB prices 1998-2013



Source: VNSO 1983; VNSO 1994; VNSO 2007; VNSO 2011

The gradual increase in the world price of cocoa over the past decade (Figure 6.2) has led to renewed interest in the crop. As a result of this trend, national cocoa production levels and yields have begun to rise after a decade of decline (Table 6.1).

Table 6.1: Vanuatu cocoa production, price and yield

	1983	**1994**	**2007**	**2013**
cocoa trees	1,739,678	3,343,700	3,042,000	3,292,000*
cocoa ha equivalent	1581.52	3039.72	2765.46	2992.72
Tonnes produced	1232	1706	1287	1649
Price per kg FOB (Vt)	149	110	181	178
kgs per tree	0.71	0.51	0.42	0.50
Yield per ha	0.78	0.56	0.46	0.55

Source: VNSO 1983; VNSO 1994; VNSO 2007; VNSO 2011

* based on assumption made by Global Development Solutions (2010) that 250,000 cocoa trees were replanted in the past 5 years

The cocoa tree is susceptible to pests and diseases and requires regular management if smallholders are to achieve yields of one tonne per hectare (or more) per year (Konam and Namaliu 2008; Lass 2008). Harvesting of cocoa pods needs to be carried out every 10-14 days during the ripening season, since pods ripen at different times; and if left on the tree, the seeds will germinate inside the pods or be lost to pests and diseases (Weightman 1989). In particular, the black pod fungus *phytophthera palimvora* is a significant cause of pre-harvest losses, spreading rapidly throughout plantations which have not been regularly pruned, weeded and cleared (Konam and Namaliu 2008; Lass 2008). A survey of pest and disease incidence rates amongst smallholder farmers on Malekula indicated an average pre-harvest loss rate of 80%, due to a combination of damage to juvenile cocoa pods by rats and the 'black pod' fungus (ACIAR 2011).

Noting that a high percentage of the potential national cocoa crop is lost to pests and diseases (ACIAR 2009), the Cocoa Development Plan (2010-14) sought to improve national production by training farmers to adopt an improved crop management method - cocoa Integrated Pest and Disease Management (IPDM) – which had been developed by the Australian Centre for International Agricultural Research (ACIAR) for cocoa growers in Papua New Guinea (ACIAR 2009; Konam and Namaliu 2008). With the assistance of ACIAR, the Government of Vanuatu introduced a cocoa agricultural

extension program centred on IPDM, in 2011, in order to improve the returns to labour offered by cocoa production, and encourage the intensification of cocoa production.

An evaluation smallholder cocoa production in Vanuatu (McGregor et al. 2009) had found that cocoa production was labour intensive, compared to copra production. On average, a smallholder household in Vanuatu harvests 22kg of cocoa (dry weight) per person day of family labour: first removing ripe pods from their plot, cracking and emptying wet beans into buckets, and carting them to a central location for processing. Smallholders then invest approximately 7 person days of labour to ferment beans, per 0.5 tonne of dry bean equivalent; and another 2 per son days of labour drying this volume of cocoa into a marketable form. Households then spend an additional person day marketing this volume of cocoa. However, the same study found that cocoa did ofter superior returns to labour. A comparison of the returns to labour offered by cocoa production in Vanuatu with the returns offered by copra, is provided in Tables 6.2 and 6.3. These Tables (6.2 and 6.3) indicate that cocoa offers higher returns to effort. Table 6.3 also indicates that households on Malekula are far more actively involved in cocoa production, and less involved in coptra production, than the average Vanuatu household.

Table 6.2: Returns to cocoa labour from smallholders in Vanuatu and on Malekula

Cocoa output (VT)	Vanuatu	Malekula
Size of holding	359 trees	2146
Equivalent area of holding (1100 trees/ha)	0.33 ha	1.95
Yield kg/ha	0.55	0.55
Production (kg)	118	1073
Price per kg (Vatu) FOB	178	178
Price per kg Vatu (farm gate = 70% of FOB)	125	125
Cash expenditure	0	0
Net revenue	22,250	134,125
Cocoa inputs (person days)		
Weeding	0	0
Pruning	0	0
Harvesting (at 22kg dry weight equivalent per day)	5.36	48.77
Fermentation (7 days per 500kg)	7**	14
Drying (2 days per 500kg)	2	4
Marketing	1	1
Total person days labour	15.36	67.77
Return (VT) per person day of labour	1448	1979
Returns (US$)* per person day of labour	**15.11**	**20.65**

(Source: McGregor et al. 2009; VNSO 2007; 2014)
* Vatu per 1 US dollar = 95.8396 on xe rates on 15/09/2014 (xe.com/currencyconverter)
** A minimum of 7 days is required to process any volume of cocoa

Table 6.2 indicates that the expected return to each person day of cocoa labour among Vanuatu's smallholders is US$15.11 and US$20.65 on Malekukla, given the scale efficiencies associated with producing greater volumes of cocoa.

Table 6.3: Returns to copra labour for smallholders in Vanuatu and on Malekula

Copra output (VT)		
	Vanuatu	**Malekula**
Size of holding	374 trees	316
Equivalent area of holding (74 trees/ha)	2.49 ha	2.10
Yield (kg/ha) dry weight	225	225
Production (kg)*	560.25	472.50
Price per tonne (FOB)	36,136	36,136
Price per tonne (farm gate price = 70% of FOB)	25,295	25,295
Cash expenditure	0	0
Net revenue	14,171	11,951
Copra inputs (person days)		
Weeding	0	
Pruning	0	
Harvesting (at 55kg dry weight equivalent per day)	10.2	8.59
Cutting a carting firewood (1.5 days per tonne equivalent)	0.84	0.71
Drying (2 days per tonne)	1.12	0.94
Marketing	1	1
Total person days labour	13.16	11.24
Return (VUT) per person day of labour	1076	1063
Return (USD) per person day of labour**	11.24	11.09

Source: McGregor and Hopa 2007; VNSO 2007; 2014

* Potential production if all available coconuts are collected

** Vatu per 1 US dollar = 95.8396 on xe rates on 15/09/2014 (xe.com/currencyconverter/

The results presented in Table 6.3 indicate that the expected return to each person day of copra labour among Vanuatu's smallholders is US$11.24; and among Malekula's smallholders, US$11.09 per person day. A comparison of Table 6.2 and Table 6.3 indicates that cocoa offers an average Vanuatu smallholder US$3.87 more, per person day of labour, than copra production; and that a Malekula smallholder obtain US$9.56 more per person day of labour, than the rate provided by copra production.

These data suggests smallholders on Malekula have a profit incentive to redirect labour from copra to cocoa production.

While cocoa production does offer a higher return to labour than copra production, significantly better returns could be achieved through the application of IPDM methods to improve the yield offered by Vanuatu's ageing cocoa tree stock (ACIAR 2009).

The IPDM program implemented by the Government of Vanuatu included teaching smallholders to regularly prune unproductive cocoa tree branches, weed around the base of each cocoa tree, remove pods infected with black pod from trees, as well as to clear leaves and branches from the forest floor in their cocoa plots (Konam and Namaliu 2008; Lass 2008). ACIAR had previously demonstrated that it could significantly improve the yields produced by smallholders managing an ageing cocoa tree stock, in Papua New Guinea (ACIAR 2009; Konam and Namilau 2008).

The package was specifically designed to be easily understood and adopted by smallholders, requiring no specific farm assets other than a machete, and some training (Konam and Namaliu 2008). Smallholders were, however, required to increase their time commitment to cocoa production, per unit of land, in order to implement the full suite of management practices.

ACIAR worked closely with existing institutions, including Government extension services and two co-operatives - the Vanuatu Organic Cocoa Growers Alliance (VOCGA) and the Cocoa Growers Alliance (CGA), which collectively

provided some extension and marketing support to over 2000 smallholder households – in the delivery of the IPDM training (ACIAR 2012).

The comparative returns to labour offered by the IPDM method, and the subsequwent rate of adoption of the method by smallholders participating in field trial, are explored in the next section.

6.3 Returns to intensive cocoa management labour: a case study

In March 2011, 72 lead cocoa farmers from 6 cocoa communities were selected to participate in a 12 month trial of the impact of cocoa IPDM on yield and the return to labour, compared to current practice; as well as on subsequent rate of farmer adoption of IPDM, amongst those participating in the trial.

Farmers selected to participate in the trial possessed an average of 1240 trees per household – some 400% higher than the national average of 365 trees (Table 6.2).

Selected farmers were required to establish 3 adjacent demonstration plots of 25 trees each, and commit to a 12 month production plan and data recording plan, with the support of extension agents. Cocoa trees were to be of a similar age and condition, so that each tree was at a similar level of productivity prior to the trial.

The trial plots each involved a different cocoa management method, requiring a set number of labour inputs. An overview of the production practices and estimated labour inputs for each plot are provided in Table 6.4.

Table 6.4: Participatory Research Appraisal of low, medium and high-intensity cocoa management

Plot Number	Estimated time required	Activity
1 – Current Practice	1/2 hour a month	Harvest good cocoa pods
2 – Improved cocoa management	3/4 hour a month	Harvest good pods Pruning
3 – Best cocoa management	1 hour most months 2 extra hours in July and January	Harvest good pods every month Removal of black pods Destruction of breeding sites Sanitary pruning 6-Monthly structural pruning of tree canopy 6-Monthly weeding around base of each tree

In Plot 1, farmers were instructed to harvest all ripe pods on a regular, monthly basis, with no additional crop management labour applied. Production activities in this Plot were designed to reflect current practice of cocoa management, matched by regular harvesting of pods. Subsequently Plot 1 tested the returns to labour offered by no cocoa management and regular harvesting.

In Plot 2, farmers were instructed to implement some minor cocoa management activities in addition to harvesting ripe pods (Table 6.5). This required participants to increase the total number of labour inputs they invested in cocoa management, as well as in regular harvesting of ripe pods. As a result, Plot 2 sought to test the returns to labour offered by partial cocoa management and regular harvesting.

In Plot 3, farmers were instructed to implement a comprehensive program of cocoa management which accurately matched the IPDM program (Table 6.5). This

included: sanitary pruning of branches; weeding around the base of trees; removal of black pods from all remaining branches; destruction of potential rat breeding sites; and regular harvesting. As a result, Plot 3 sought to test the returns to labour offered by IPDM.

All participating farmers were instructed on how to keep records of the total number of labour hours committed to carry out the prescribed activities for each plot, each month. Farmers were also asked to record the total number of good cocoa pods harvested from each plot, each month, over the course of the 12 month trial. This information was used to calculate the comparative returns to labour provided by each cocoa management method.

The returns to effort provided by current cocoa management practice (Plot 1) are provided in Table 6.5. The average amount of beans produced from the pods harvested from the 25 trees in Plot 1 was 1.79 kg per month (dry bean equivalent), or 21.44 kgs for the entire 12 months of the trial. Participants spent an average of 54.14 minutes every month to harvest this quantity. This equated to an average monthly wage of 292.86 Vatu, or $US3.06 an hour.

Table 6.5: Plot 1 yield, time input and returns to labour

Month	Pods harvested	Mins	Pods/hour	Dry Bean production (KG)	Dry beans/ hour	Wage (Vt)/hour	Wage (US$)/hour**
JULY	87	65.55	79.63	2.42	2.21	331.81	3.46
AUGUST	88	60.63	87.09	2.44	2.42	362.86	3.79
SEPTEMBER	57	44.5	76.85	1.58	2.13	320.22	3.34
OCTOBER	42	45.13	55.84	1.17	1.55	232.69	2.43
NOVEMBER	32	50.25	38.21	0.89	1.06	159.20	1.66
DECEMBER	21	37	34.05	0.58	0.95	141.89	1.48

JANUARY	17	49.63	20.55	0.47	0.57	85.63	0.89
FEBRUARY	74	49	90.61	2.06	2.52	377.55	3.94
MARCH	110	47.86	137.90	3.06	3.83	574.59	6.00
APRIL	90	61.88	87.27	2.50	2.42	363.61	3.79
MAY	75	76.29	58.99	2.08	1.64	245.77	2.56
JUNE	79	62	76.45	2.19	2.12	318.55	3.32
AVERAGE	**64.33**	**54.14**		**1.79**	**1.95**	**292.86**	**3.06**
TOTAL	**772**	**649.72**		**21.44**			

Source: author's survey
* 30 beans per pod, average of 108 beans per 100g for Malekula farmers = 36 pods per kg of dry bean
^ price per kg dry bean cocoa used is farm gate 150 vt
** Vatu per 1 US dollar = 95.8396 on xe rates (www.xe.com) on 15/09/2014

The returns to effort provided by partial cocoa management (Plot 2) are provided in Table 6.6. The average volume of beans produced by this method was 2.69 kg per month (dry bean equivalent), or 32.31kg for the entire 12 months of the trial. Participants spent an average of 76.12 minutes per month to manage the plot and harvest this quantity. This equated to average monthly wage of 318.40 Vatu, or US$3.32 an hour.

Table 6.6: Plot 2 yield, time input and returns to labour

Month	Pods harvested	Mins	Pods/hour	Dry Bean production (KG)	Dry beans /hour	Wage (Vt)/hour	Wage (US$)/hour**
JULY	93	88.31	63.19	2.58	1.76	263.28	2.75
AUGUST	71	73.92	57.63	1.97	1.60	240.12	2.51
SEPTEMBER	69	76.17	54.35	1.92	1.51	226.47	2.36
OCTOBER	78	65	72.00	2.17	2.00	300.00	3.13
NOVEMBER	83	75.5	65.96	2.31	1.83	274.83	2.87
DECEMBER	82	74.8	65.78	2.28	1.83	274.06	2.86
JANUARY	137	71.9	114.33	3.81	3.18	476.36	4.97
FEBRUARY	109	78.4	83.42	3.03	2.32	347.58	3.63
MARCH	132	76	104.21	3.67	2.89	434.21	4.53
APRIL	90	80.82	66.82	2.50	1.86	278.40	2.90
MAY	122	83.7	87.46	3.39	2.43	364.40	3.80
JUNE	97	71.1	81.86	2.69	2.27	341.07	3.56

AVERAGE	**96.92**	**76.12121**	**2.69**	**2.12**	**318.40**	**3.32**
TOTAL	**1163**	**915.62**	**32.31**			

Source: author's survey
* 30 beans per pod, average of 108 beans per 100g for Malekula farmers = 36 pods per kg of dry bean
^ price per kg dry bean cocoa used is farm gate 150 vt
** Vatu per 1 US dollar = 95.8396 on xe rates (www.xe.xom) on 15/09/2014

The returns to effort provided by the recommended cocoa management practice (Plot 3) are provided in Table 6.7. The average volume of beans produced by labour-intensive cocoa management was 4.26 kg per month (dry bean equivalent), or 51.14 kg for the entire 12 months of the trial. Participants spent an average of 82.24 minutes per month to manage the plot, and harvest this quantity. This equated to an average monthly wage of 439.65 Vatu, or US$4.59 an hour.

Table 6.7: Plot 3 yield, time input and returns to labour

Month	Pods harvested	Mins	Pods/hour	Dry Bean production (KG)	Dry beans /hour	Wage (Vt)/hour	Wage (US$)/hour**
JULY	81	155.1	31.33	2.25	0.87	130.56	1.36
AUGUST	113	71.92	94.27	3.14	2.62	392.80	4.10
SEPTEMBER	76	87.27	52.25	2.11	1.45	217.72	2.27
OCTOBER	101	72.69	83.37	2.81	2.32	347.37	3.62
NOVEMBER	129	86.67	89.30	3.58	2.48	372.10	3.88
DECEMBER	109	72.92	89.69	3.03	2.49	373.70	3.90
JANUARY	89	44.5	120.00	2.47	3.33	500.00	5.22
FEBRUARY	73	88.1	49.72	2.03	1.38	207.15	2.16
MARCH	183	90.09	121.88	5.08	3.39	507.83	5.30
APRIL	487	111.44	262.20	13.53	7.28	1092.52	11.40
MAY	310	91.6	203.06	8.61	5.64	846.07	8.83
JUNE	90	78.13	69.12	2.50	1.92	287.98	3.00
AVERAGE	**153.42**	**82.24**		**4.26**		**439.65**	**4.59**
TOTAL	**1841**	**1050.43**		**51.14**			

Source: author's survey
* 30 beans per pod, average of 108 beans per 100g for Malekula farmers = 36 pods per kg of dry bean
^ price per kg dry bean cocoa used is farm gate 150 vt
** Vatu per 1 US dollar = 95.8396 on xe rates (www.xe.xom) on 15/09/2014

A comparison of the results for the three cocoa management practices reveals that labour-intensive cocoa management (Plot 3) not only provides the best yields, but the best returns to labour (Table 6.8). Labour-intensive cocoa management (Plot 3) offers a return to labour some 50% higher, and a yield 238% higher, than current practice (Plot 1). Whilst the returns to labour provided by labour-intensive cocoa management (Plot 3) are 38% higher, the yield provided by intensive management is some 58% higher than those offered by partial cocoa management (Plot 2). The yield offered by partial cocoa management (Plot 2) provided a return to labour 8% higher, and a yield 50% higher, than current practice (Plot 1). These results indicate that labour-

intensive cocoa management (Plot 3) would more than double national production, if adopted nationally.

Table 6.8: Yield (kg) and return to labour (%) comparison between Plot 1 2 and 3

	Plot 1	Plot 2	Plot 3
Average dry weight production per tree (kg)	0.86	1.29	2.05
Yield per ha equivalent (kg)	946	1419	2255
Yield per ha as a % of Plot 1	100%	150%	238%
Average wage (US$/hour)	3.06	3.32	4.59
Returns to labour as a % of Plot 1	100%	108%	150%

Source: Author's survey

A comparison of the results presented in Table 6.8 with Table 6.1, indicates that the per tree yield provided by current practice (Plot 1): 0.86 kg, is significantly higher than the average yield achieved by smallholders nationally: just 0.55 kg per tree. This result illustrates the potential yield increase which could be achieved through a strategy of harvesting ripe pods on a monthly basis, rather than losing so many pods to pests, disease and waste through incomplete, or infrequent, harvesting.

An analysis of the additional number of person days of labour required to implement labour-intensive cocoa management practices (Plot 3) across a smallholder's entire cocoa sub-holding, for an average cocoa smallholder in Vanuatu, and on Malekula, is presented in Table 6.9.

Table 6.9: Time input (per month) comparison between Plot 1 2 and 3, and average farmer

(n72)	Plot 1	Plot 2	Plot 3
Time investment 357 trees (hours)	12.89	18.12	19.57
Time investment 1240 trees (hours)	44.76	62.93	67.99
Time investment 2146 trees (hours)	77.45	108.90	117.65
Time investment 357 trees (person	1.61	2.26	2.45

days)			
Time investment 1240 trees (person days)	5.60	7.87	8.50
Time investment 2146 trees (person days)	9.68	13.61	14.70

Source: Author's survey

Table 6.9 indicates that a smallholder possessing a sub-holding of cocoa of a size equivalent to the national average (359 trees) would need to supply an additional 1.61 person days of family labour per month, or just under 20 person days per year, to fully harvest their cocoa resource (Plot 1) for their entire sub-holding, which would increase their yields per tree to 0.82kg (dry weight). Adoption of the additional cocoa management practices undertaken in Plot 2 across an average Vanuatu smallholder's entire sub-holding, would require an additional 2.26 person days of labour per month, or 27.12 person days in a year, in return for a yield of 1.29 kg of beans (dry weight) per tree. Adoption of the full suite of cocoa management undertaken in Plot 3 across an average Vanuatu smallholder's entire sub-holding, would demand an additional 2.45 person days per month, or 29.4 person days in a year, in return for a yield of 2.05 kgs per tree (dry weight).

A household looking to implement a strategy of regularly harvesting of their pods, or implementing improved or complete cocoa management across a sub-holding with the average number of cocoa trees possessed by a smallholder on Malekula (2146), would demand an input of significantly more labour. To adopt the practices in Plot 1, they would need to commit an additional 9.7 person days a month, or 116.2 person days a year. For Plot 2, they would need to commit 13.6 additional person days a month, or

163.3 person days a year. For Plot 3, an addition of 14.7 person days per month, or 176.4 person days a year, would need to be contributed by the household on Malekula.

There are limits to the amount of additional time that smallholder households, dependent on family labour, can contribute to cocoa, given that households pursue a diversified income strategy that sees them divide their time between multiple cash and food crops, in addition to off-farm activities. This affects the rate of adoption of improved cocoa management practices amongst the sample population.

6.4 Intensive cocoa management adoption rates following the trial

To establish adoption rates following the conclusion of the one year trial, each participant in the trial was subsequently surveyed to establish their intention to adopt the cocoa management practices carried out by them in any of Plot 1, Plot 2 or Plot 3. The questionnaire aimed to identify the potential barriers to adoption, and to inform the large household survey of cocoa producers. The questionnaire tested: (i) participant knowledge of the components of the 'best cocoa management' method; (ii) their understanding of the link between the components of the method and the spread of cocoa pests and diseases; and (iii) whether the lack of training or quality of training were reasons for non-adoption. Further, it tested whether demand from other farm and non-farm activities, the selling price of cocoa relative to other crops, or an increase in the level of household expenses, were important explanatory factors in smallholder decisions of whether or not to increase their household supply of labour to cocoa. The results of this survey are presented in Tables 6.10 and 6.11.

Table 6.10: Cocoa management knowledge and practices (n72)

(n72)	Yes%	No%	Don't know%
Received cocoa management training	100	0	0
Correctly identified cause of pre-harvest losses	61	39	0
Correctly identified components of the 'best cocoa management' method	84	12	4
Would adopt best cocoa management method	24	76	0

Source: author's survey

Table 6.10 reveals that while 84% of respondents could accurately identify the different components of the 'best cocoa management' program upon which they were trained (Plot 3), and 61% could accurately identify that poor cocoa management was the cause of their current pre-harvest losses, only 24% of participants stated that they planned on adopting the full IPDM cocoa management program.

Table 6.11: Cocoa management attitudes

(n72)			
Main reason for allocating more time to cocoa management (%)		**Main reason for NOT allocating more time to cocoa management (%)**	
Indicator	*Response*	*Indicator*	*Response*
Cocoa price goes up	94	Time spent on food production	16
Price of expenses go up	4	Time spent on copra production	56
Price of other cash crops goes down	1	Time spent on inter-household transfers	18
Other	1	Other	10

Source: author's survey

Table 6.11 illustrates the main reasons cited by cocoa producing households for not supplying more family labour to cocoa production, indicating that most households identify that they are too busy with their other economic activities – particularly copra

production – to adopt cocoa IPDM. However, households overwhelmingly indicated that they would be willing to allocate more time to cocoa production if the price of cocoa went up, while other factors were of minor importance (Table 6.11).

6.5 Conclusion

The study findings reported in this chapter indicate that almost three quarters of smallholders will not adopt IPDM of cocoa at current prices. However, respondents did indicate that a further increase in the price of cocoa may entice them to adopt this method. Although cocoa IPDM offers a superior return to effort, it currently does not yet offer a sufficient return to labour to entice cash crop labour from the more convenient, 'flexitime' cash crop cocoa. This indicates that smallholders place a significant premium on the flexibility afforded by copra production – a premium that is close to US$16.45 per day. This premium os essentially the difference between the return to labour (per day) offered by cocoa produced using full-IPDM (US$27.54, based on a 6-hour day) and copra production (US$11.09). Though only 18% of households indicated that they would not be willing to adopt cocoa CCI because of their commitments to inter-household transfers, the premium placed on the flexibility offered by copra perhaps indicates that maintaining the household labour time to meet one's social obligations is of significant importance to the household.

While the low rate of planned adoption of cocoa IPDM is a definitive result, it is not yet understand just why smallholders would not commit more labour to cocoa at the expense of copra – particularly considering the large difference in the relative

returns offered by the two crops.Further investigation of the social and economic importance of inter-household transfers is explored in the following Chapter.

7 Smallholder household motivations to contribute family labour to inter-household transfers: a Best-Worst scaling approach

7.1 Introduction

The aim of this chapter is to answer empirically the subsidiary research questions: 'What social and economic benefits are the most important factors motivating households to supply labour to inter-household transfers?' and 'Can distinct clusters or sub-populations be identified to distinguish how and why households supply labour to inter-household transfers?' This chapter uses a unique Best Worst (BW) scaling experiment to establish the most important factors motivating smallholder households to allocate labour to inter-household transfers. Latent Class (LC) cluster analysis is used to assess whether distinct 'clusters' of households within the sample set can be identified, based on similarities in the relative importance ascribed by households to each of the motivating factors identified as influencing smallholder decisions to allocate labour to inter-household transfers on Malekula. This analysis uses the key household variables identified in Chapter 4 as active covariants. An ex-post analysis of differences in covariance (ANOVA) between characteristics of clusters is undertaken in order to identify which household factors are most important for describing the household set in each of the clusters. The theoretical background motivating the development of BW scaling, LC cluster analysis and ANOVA is provided in Chapter 4. This chapter therefore provides an empirical test of the factors motivating households to supply labour to inter-household transfers that were identified

in the literature (Chapters 2 and 3), indicating that households sought to either increase the marginal utility of the rural community by redirecting resources from surplus to deficit households, or improve their social relations with elites in the community in order to obtain long-run social and economic benefits.

This is the first known study to use BW scaling to understand how households derive social and economic benefits from their investment of household labour in 'inter-household transfers. Combining the BW scaling experiment with LC cluster analysis helps to identify any significant heterogeneity among rural smallholder households' in the relative importance ascribed to each of these social and economic benefits (termed motivating factors) as a source of motivation to invest household labour resources in inter-household transfers.

Using this methodology, this chapter identifies that, whilst there are distinct clusters within the sample set, a majority of households in the sample are highly motivated to contribute to inter-household transfers in order to accumulate higher social status and secure access to supplementary inputs of labour and land in the long run. Households are not exclusively motivated by private benefits: they are also highly motivated to contribute labour towards the production of public goods, such as the maintenance of the authority of chiefs, from which they are thought to derive private benefit (such as improved law and order and dispute settlement); as well as to obtain improved social status for their household. This chapter also finds that households are not highly motivated to contribute to inter-household transfers as a form of traditional social insurance against crop failures resulting from natural disasters or crop pest and

disease outbreaks. Further, some households contribute to inter-households transfers in order to obtain long-run private advantages, such as improved access to village land and labour. This is an important finding and helps inform our understanding of the utility of inter-household transfers - beyond the short-term assignment of labour, land or gifts goods.

In the next section, to justify the selection of factors most commonly indentified as motivating inter-household transfers, the international economics and anthropology literature, as well as literature from Vanuatuis reviewed. The chapter then provides an outline of the method used to examine the relative importance assigned to these factors by households on Malekula, using 1) a BW Scaling experiment, 2) LC Cluster analysis and 3) ANOVA. The results of these methods are subsequently interpreted for discussion, and conclusions drawn regarding the most important factors motivating households to contribute labour resources to inter-household transfers, for each cluster and for the sample population as a whole.

7.2 Risk pooling strategies and smallholder allocation of labour to agricultural production activities

Previous studies have shown that smallholder households act to minimize their exposure to production and market failures through the adoption of 'risk pooling' measures which lead to inter-household transfers of inputs and consumption goods. These include the following: the redistribution of surplus food to households suffering from crop failure (Coate and Ravillion 1993; Fafchamps 1999; Fafchamps 2008;

Rosenzweig 1988); the establishment of reciprocal labour exchange relationships (Chibnik and de Jong 1987; Crocombe 1987; Otsukaa et al. 2001); and adoption of strong local institutions for regulating household access to common land and water resources, to reduce overuse (Binswanger and McIntire 1987; Cramb and Wills 1990; Yaro 2010). Similarly, smallholder communities may develop strong local institutions for mobilizing private contributions towards the production of public goods such as the maintenance of public spaces, transport and marketing infrastructure, and for maintaining law and order in the immediate area (Ellis 1992).

Smallholders may also be motivated to invest resources in strengthening their social relations with other households and their relative status within the community, in order to improve their rate of access to these benefits in the future (Bebbington 2008; Bebbington and Perreault 1999; Postlewaite 2011). Therefore, smallholder households may be motivated to withhold labour from agricultural and non-agricultural production activities in order to invest labour in inter-household transfers.

Households in Vanuatu are expected to assist their kin network members in celebrations of the various life cycle ceremonies (births, circumcisions, weddings, 'grading' ceremonies, funerals) with contributions of cash, consumption goods and customary wealth items, such as mats and pigs (Rio 2007). On average, each rural village hosts twelve of these ceremonies per year (Malavatumauri 2013). The cost of these ceremonies place significant demands on households, who engage in fundraising drives to obtain financial and other contributions from households (Rio 2007). The literature exploring the potential social and economic factors motivating smallholders in

PICs and Vanuatu to allocate scarce household resources to non-agricultural production activities was explored in Chapter 3.

Contributing to village labour activities and ceremonies is identified as an important objective of rural households in Vanuatu (Malavatumauri 2013). In a national survey of well-being, more than 90% of respondents answered that they regularly engage in inter-household transfers to ensure maintenance of respect for the institutions of church, family and their chief (ibid.).

Smallholder households in Vanuatu are expected to contribute family labour to a number of group labour days (e.g. chiefs day, youth day, women's day and co-operative day) held in the village every week, and presided over by a village authority. The authority may be the chief or church, but it extends to women's committees, youth groups and farming co-operatives that carry out a set number of work tasks (ACIAR 2012). While these labour tasks include contributions to public goods such as road and bridge mending, they extend to supplying agricultural labour to the landholdings of other members of the community (Kalpnel 2012).

As a result, it is expected that smallholders on Malekula invest a significant proportion of their household resources to these inter-household transfers, without any clear evidence of the reciprocal benefits they derive from this investment. These benefits, and differences in how these motivate households to invest their resources in inter-household transfers, are the focus of the rest of this chapter

7.3 Model specifications and empirical methods

7.3.1 Determining the attribute set

Determining the attribute "set," involved an extensive literature review, supplemented by a series of semi-structured interview with key informants. The set of attributes and their descriptions were refined several times. Changes to the survey instrument were made to ensure that the motivations in the selected set of 11 attributes adequately represented the full range of social, economic and public good benefits households could expect to derive from investment in social capital formation. The final attribute set is presented and described in detail in Table 7.1

Table 7.1: The 11 factors motivating households (attribute set)

Motivating Factor	Descriptions
Maintain traditional village life	It is important to contribute household resources to community activities in order to maintain the traditional way of life
Respect requests of elders and chiefs	It is important to contribute household resources to community activities out of respect for the authority for elders and chiefs
Respect request of other families	It is important to contribute household resources to community activities out of respect for other families.
Respect requests for priest or reverend	It is important to contribute household resources to community activities out of respect for the authority of my priest or reverend
Improve the status of my family	It is important to contribute household resources to community activities in order to improve the status of my family.
Improve my own status	It is important to contribute household resources to community activities in order to improve my status.
Receive support in a dispute	It is important to contribute household resources to community activities so that other families support my family if we are engaged in a dispute.
Receive financial contributions for celebrating 'life cycle' ceremonies	It is important to contribute household resources to community activities so that other families will provide gifts of food and money when someone in my family gets married, dies or gets circumcised.

Receive help in emergencies	It is important to contribute household resources to community activities so that other families will provide gifts of food and money if my family is temporarily short of these things
Gain access to non-family labour	It is important to contribute household resources to community activities to ensure that I receive additional labour when needed
Gain access to land	It is important to contribute household resources to community activities to ensure that I can access more land when needed.

Three of the eleven motivating factors included in the choice experiment were related to the importance of labour allocation for social capital formation: to increase the status of the household; to increase one's personal status; and to ensure the household is supported in a dispute. A household's social capital and relations are critical to facilitating access to contested resources, where access is determined by non-market institutions (e.g. Berry 1992; Bebbington and Perrault 1998; Gounder 1960; LaFavre and Thomas 2012). Given the frequency of land disputes in the rural areas of Vanuatu (Malavatumauri 2013) ensuring support of influential households in a land dispute was also identified as a potentially important factor motivating households to invest in social capital formation.

Four of the eleven motivating factors highlighted specific potential short-term and long-term economic benefits that could be gained by households, as a result of household labour allocation to village activities. These include the following: to ensure that one's household receives many gifts of food and cash when it comes to their time to host a 'life cycle' ceremony; to ensure the household receives additional labour when required; to ensure the household receives additional land as needed; and to ensure the household receives emergency assistance when required. Securing access to additional

labour inputs was included as one possible motivation, given that research conducted through semi-structured interviews identified that select households were provided with supplementary labour through village institutions (Kalpnel, 2012). Ensuring access to additional land when required was included given the importance of this input to increasing household income levels in Vanuatu (Rodman and Ward, 1995), and the strong links between size of landholding and household livelihoods in the literature (e.g. Barrett, 1993; Fafchamps, 1992; Jayne *et al.*, 2003). The factor 'receive contributions for ceremonies' was included because of the demand that the celebration of 'life cycle' ceremonies places on household budgets and the importance of securing contributions from others in order to meet these expenses (Rio 2007). The motivation to invest household resources to secure future access to emergency assistance was included Also, considering theas there is a large frequency of natural disasters in Vanuatu (World Bank 2012) and a large share (86%) of households have been shown to seek the support of other households in times of sickness and financial need (Malavatumauri 2013). Similarly a national survey (ibid.) found that rural households believed that it was very important to contribute to cultural ceremonies (73%); and that it was important to help others (88%) and reciprocate help shown to one's own family (81%).

The remaining four variables included in the choice experiment reflect on the maintenance of the integrity of the inter-household transfer system: maintain traditional village life; respect the requests of elders and chiefs; respect the requests of other families; and respect the requests of reverends and priests. 'Maintaining traditional village life' is concerned with the motivation to maintain the customary tradition of

‘voluntarily’ contributing resources to community activities, and to other families, which underprin the cultural system operating in the village. The variable ‘respecting the requests of other households’ was included to identify whether or not it was seen as important to respond directly to appeals for assistance from private households, or whether or not it was more important to respond to requests for contributions from traditional authorities, in order to better understand reciprocity in this cultural context. ‘Respecting the authority of elders and chiefs’ and ‘respect the authority of priests or reverends’ are concerned with maintaining the integrity of the capacity of specific authorities to command family labour for specific public or private initiatives, such as the maintenance of law and order, and or public infrastructure.

These motivating factors were selected for the BW scaling experiment because a national survey (Malavatumauri 2013) of household attitudes towards traditional or ‘kastom’ institutions in Vanuatu found that the authority of chiefs was highly respected in rural areas (66%), and that maintaining respect for chiefs and leaders was identified as important by 90% of respondents. Given that the same survey (ibid.) found that almost half of rural households had been victims of theft as well as vandalism in the previous twelve months, maintaining social cohesion and the traditional authority of chiefs and elders was considered to offer potential private benefits to households by improving local law and order. Maintaining the traditions of helping others associated with traditional village life, was considered to offer private households other benefits such as the assignment of supplementary labour, and the provision of emergency assistance.

The final BW questionnaire required each respondent to complete 11 BW choice sets. The 11 motivating factors were arranged as indicated in Table 7.2. Using the balanced incomplete block design (BIBD) method (Cohen 2009; Green 1974; Raghavarao 1971), the 11 buyer attributes were arranged as indicated in Table 7.2. Given a set of 'v' attributes, 'b' number of choice sets (block), 'r' replications and 'λ' sets of pairs, a BIB design was expressed as (b, r, k, λ). According to Green (1974) there are three conditions that should be considered in the BIB design. First, each attribute appears once in each number choice. Second, each attribute appears in exactly r replications and the last is each pair of attribute appears exactly λ times together. Considering these characteristics, this research used design 11, 5, 5, 1, that is each respondent received 11 choice sets and each attribute appeared five times, each choice set contained five attributes and each attribute appears only once per choice set. Therefore, every attribute appeared an equal number of times in the design; and was assessed in combination with every other variable.

Table 7.2: Design of the 11 BW Scalting Tasks (A-K)

Motivating Factor	Block	Attribute in each block (Design 11, 5, 5 1)				
1. Maintain traditional village life	A	1	3	4	5	9
2. Respect authority of elders and chiefs	B	2	4	5	6	10
3. Respect requests of other families	C	3	6	7	8	11
4. Respect authority of priest or reverend	D	1	4	6	7	8
5. Increase status of the household	E	2	5	7	8	9
6. Increase my own status	F	3	6	8	9	10
7. Receive contributions to ceremonies	G	4	7	9	10	11
8. Receive labour when needed	H	1	5	8	10	11

9. Receive land when needed	I	1	2	6	9	11
10. Receive support in a dispute	J	1	2	3	7	10
11. Receive assistance in times of need	K	2	3	4	8	11

Source: Author's survey

7.3.2 Best-Worst Scaling Experiment

This chapter draws on data collected from smallholder households on Malekula between September 2012 and March 2013, from a random sample of 530 rural farming households.

After the BW scaling experiment was designed, pre-tested and refined to reflect necessary changes, the 530 household heads that completed the questionnaire were asked to participate in the BW scaling experiment. At the beginning of the choice experiment, the respondent was informed:

"We are interested in understanding the importance of 11 different motivations or reasons for contributing family labour to activities such as Chief's day, Youth day, Church Day, Women's or Men's day; and helping other families with their agricultural activities. Please help us to understand which you consider the most important, and the least important, motivations for making these contributions."

Specifically, each task was then presented to the respondent (household head). Before each, they were asked:

"Considering the five characteristics presented below, please tick one box in the left column to indicate the characteristic that is MOST important to you and please tick

one box in the right column to indicate the characteristic that is LEAST important to you. Please tick only one box per column."

Example

Most important (tick one box)	**Of these, which are the most and least important to you?**	**Least important (tick one box)**
☐	In order to access labour in the future	☐
☐	In order to access to land in the future	☐
☐	To respect the authority of the priest or reverend	☐
☐	To receive support in a future dispute	☐
☐	In order to respect the requests of other families	☐

The responses to the BW scaling experiment enabled the study team to measure the relative importance of different social and economic benefits that may influence households labour supply responses. Given the absence of (logitdunal) panel data quantifying the relationship between labour outflows to inter-household transfers and household social and economic benefits over time, this approach enables estimation of the potential long-run utility benefits provided by transfers of household resources to inter-household transfers. The use of the BW scaling method provided a more robust method for identifying relative attribute importance by avoiding selection biases related to how respondents use rating scales (Cohen and Markowitz 2002; Flynn et al. 2007; Marley 2011; Umberger et al. 2015).

7.3.3 Sample and data analysis

To identify the importance of the 11 motivating factors, the responses of the 530 households in the sample were analysed. The initial analysis focused on the aggregate sample. The BW analysis adapted the procedures outlined in Cohen (2009) and Umberger et al. (2015). The relative importance of each motivating factor is determined using a Standardized Interval Scale (SIS). The SIS is calculated by first examining all respondents' answers to the BW tasks and calculating respondents' selections of most and least important attributes to create two aggregate frequency values for each attribute: 'most' and 'least'. The aggregate frequency values are the number of times each attribute is chosen as most important and the least important. The square root of the 'most' frequency value divided by the 'worst' frequency is calculated (SQRT(B/W) for each attribute. To avoid dividing by zero, the 'worst' frequency of each attribute is added by 0.5 (Cohen, 2009). A scale is created with the attribute with the highest SQRT(B/W) becoming 100 (most important) and all other buyer attributes are scaled relative to this attribute. The results of the standardized interval in this case are interpreted as the percentages of the attributes that are to be chosen as the most important (Cohen 2009).

The LC cluster model is undertaken to examine whether there was significant heterogeneity in the respondents' selection of the most and least important motivations to supply labour to inter-household transfers. All 530 households' individual BW scores for all 11 buyer attributes are utilized as indicator variables. The score values are obtained by adding the number of times each head of household (*i*) indicates an attribute

(j) as best (B_{ij}) and worst (W_{ij}). Then the sum of the worst in each attribute is subtracted from the sum of the best.

To predict the characteristics of each cluster, the covariates (presented in Chapter 4) are included in the analysis. These include: the age of household head; education level of household head; size of labour endowment and number of dependents; total income level; off-farm income level; size of landholding; proportion of land held under freehold land tenure; possession of labour-saving farm assets; possession of wealth items; the distance of the household from the main market for cash crops on Malekula; whether a member of the household successfully accessed a bank loan in the last 5 years; and the number of person days of family labour that households in their village are expected to contribute to inter-household transfers every week. The covariates are treated as active variables in the LC cluster model. To provide further insights on the clusters, an ex post analysis characterization was conducted in Stata (10.1) using an ANOVA with a Tukey HSD test (explained in Chapter 2).

7.4 Results

7.4.1 Best Worst scaling aggregate analysis

Each of the 11 variables was given an aggregated "score" equal to the number of times it is selected as "best" minus the number of times it is selected as "worst". These score differences were then placed in descending order to give a ranking of the issues from "most important" to "least important." The aggregate BW Scaling SIS values for

all respondents are presented in Table 7.3, alongside the standard score, aggregated scores, and square root ratio. The SIS values are used to interpret the aggregate 'best' and 'worst' motivations. The higher and more positive the 'Aggregate BW' Scaling score, the higher the importance. The results in Table 7.3 indicate that, on average, the factor *to maintain traditional village life* is the most important aggregate motivation (standardized to 100%) for determining household allocation of labour to inter-household transfers. *Ensuring support in a dispute* is the least important motivating factor (achieving approximately 15% relative importance). Scaled at 95%, the factor *respect the authority of elders and chiefs* can be considered as a very important motivation for households. *Improving the status of the family* (86%); *to access land in the future* (71%); *respecting the authority of the priest or reverend* (53%) are also important factors motivating households to allocate labour to inter-household transfers. Three factors received similar scores and can be considered as only moderately important to the average household: *to access labour in the future* (49%); *improving my own status* (47%); and *respecting the requests of other families* (43%). Less important were the factors *to receive contributions in times of need* (38%) and *to receive contributions to ceremonies* (28%).

Table 7.3: Motivations to allocate household labour to inter-household transfers (n=530)

	Standard scores		Aggregated Scores		SQRT of B-W ratio	Standardized distance	Ranking
Variable	**Most**	**Least**	**B-W**	**Ratio B/W**	**B/W**	**SQRT Interval**	**based on**
Maintain traditional village life	950	272	678	3.49	1.86	100	1
Respect authority of elders and chiefs	864	274	590	3.15	1.77	95.02	2
Improve access to land	765	435	330	1.76	1.33	70.95	4
Improve status of family	624	242	382	2.58	1.61	85.92	3
Receive emergency assistance	425	850	-425	0.50	0.71	37.84	9
Respect authority of priest or reverend	385	390	-5	0.99	0.99	53.16	5
Improved access to labour	333	396	-63	0.84	0.912	49.07	6
Respect requests of other families	324	495	-171	0.65	0.81	43.29	8
Improve my own status	299	383	-84	0.78	0.88	47.28	7
Receive contributions to ceremonies	164	575	-411	0.29	0.53	28.58	10
Receive support in a dispute	70	891	-821	0.08	0.28	15.00	11

Note: Standard score= count best-count worst/6 where Count best = total number of times an attribute was most important; Count worst = total number of times an attribute was least important n is the number of questionnaires and 6 is the frequency of the appearance of each attribute in the design

This aggregate analysis indicates that the maintenance of traditional authority and the integrity of the tribal institutions are the primary factors motivating households to contribute labour resources to community activities, thus suggesting that chiefs and elders are viewed by households as the agents most capable of commanding labour and providing public and private benefits to households.

The relatively low level of importance placed on two factors: '*respect authority of priests or reverends*' and '*respect requests of other families*' suggests that these agents possess a lower level of capacity to redistribute community labour and other resources that may result in both public and private benefits.

Table 7.3 reveals that the factor '*improve the status of my family'* was ranked third-most important, and therefore the use of household labour to secure private benefits was considered to be a critical factor for motivating the contribution of household resources to community activities. In contrast, the motivation to '*improve my own status*' scored relatively lower, in seventh place, indicating that the status of the household unit is viewed as being more important than any one individual member. At least this is true when considering ways to secure improved household access to social and economic benefits that are managed by the community. Despite the prevalence of land disputes in rural Vanuatu, '*ensuring support in a dispute*' came in last place as the eleventh most important attribute. Certainly, few households considered that their participation in community activities would help enlist other households to support them in future disputes.

The motivation to secure private economic benefits through '*improved access to land*' was considered the fourth-most important factor, and therefore critical to incentivizing households to contribute resources to community activities. *'Improved access to labour*' was slightly less important, in sixth place. These results indicate that household contributions are reciprocated through the assignment of additional land and labour in the future, in addition to public good benefits flowing from improved local

authority to maintain law and order, and infrastructure. In contrast the motivations to participate in these activities to '*receive contributions to ceremonies*' and *receive emergency assistance*' were not deemed important, coming in tenth and ninth place respectively. This indicates accessing consumption goods or financial aid are less important to households than accessing the production inputs land and labour, perhaps because these goods are available elsewhere without the need for significant additional investment in social capital formation. This result perhaps also reflects the relative scarcity of additional inputs of land and labour.

7.5 Household heterogeneity

The 11 'Aggregate BW' Scaling scores presented in Table 7.3 are considered approximate measures of relative importance (Marley and Louviere 2005). The aggregate analysis for each sample group as presented above assumes that the preferences of households related to the 11 motivational attributes are homogeneous. In reality, differences in expressed preferences exist among households in any sample population and therefore, one should assume heterogeneity in the expressed motivation to allocate resources among the households in our sample.

The LC cluster analysis was used to explore if households are heterogenous in the relative importance they place on the 11 motivating factors, and to determine if we can identify unique sub-sets or segments of smallholders that rate the importance of motivating factors in a similar way.

The LC cluster analysis revealed four distinct clusters or segments of households, each with unique demographic characteristics, attitudes and preferences. Table 7.4 provides summary statistics for the one to four cluster solutions in the traditional channel sample. Magidson and Vermunt (2004) explain that the model L^2 statistic can be used to assess how well the model fits with the data by indicating the amount of association among the variables that remains unexplained after estimating the value. Therefore the lower the L^2 value, the better the fit of the model to the data. Magidson and Vermunt (2004) suggest that a p-value higher than 0.05 is preferable; and that lower degrees of freedom are preferable; and the lowest classification error is preferred. One method for assessing the p-value of the model is the use of the bootstrap of L^2. This provides a more precise estimate by relaxing the assumption that the L^2 statistic follows a chi-squared distribution. Table 7.4 indicates that the 4-cluster model best meets this range of criteria.

Table 7.4: Summary of the LC cluster analysis

	No. of cluster	LL	Npar	L^2	p-value	Boot p-value	c.e	Degrees of freedom	R^2
Model1	1-Cluster	-9985.12	96	19970.24	4.5e-3913	0.1880	0.00	401	1
Model2	2-Cluster	-9635.84	129	1927.50	2.7e-3792	0.1420	0.03	369	0.88
Model3	3-Cluster	-9323.71	162	18618.71	5.8e-3682	0.1420	0.02	337	0.94
Model4	4-Cluster	-9037.69	195	18053.62	1.9e-3590	0.0960	0.01	305	0.95

7.5.1 Four-class cluster analysis

For each LC Cluster, the mean BW scores and the SIS values for the 11 attribute are provided in Tables 7.5 and 7.6, respectively.

Table 7.5: Mean BW Scaling Scores for 11 motivations for household labour allocation to inter-household transfers, by LC Cluster (4 Cluster Solution)

	Cluster 2	**Cluster 1**	**Cluster 3**	**Cluster 4**
Segment Size	**34%**	**32%**	**17%**	**16%**
Motivation	**Mean BW**	**Mean BW**	**Mean BW**	**Mean BW**
1. Maintain traditional village life	0.22	0.98	1.13	0.33
2. Respect authority of elders and chiefs	0.00	0.67	0.79	-0.56
3. Respect requests of other families	-0.25	-0.38	0.80	-0.51
4. Respect authority of priest/reverend	0.18	-0.36	0.79	-0.53
5. Improve status of the household	-0.08	0.85	-0.15	0.83
6. Improve my own status	-0.02	0.09	-0.39	-0.22
7. Receive contributions to ceremonies	0.22	-0.58	-0.31	-0.28
8. Receive contributions in times of need	0.45	-1.73	-0.47	0.98
9. Improve access to labour	-0.05	0.33	-0.62	0.77
10. Improve access to land	0.14	0.44	-0.92	0.66
11. Receive support in a dispute	-0.08	-0.78	-1.11	-1.83

Table 7.6: Standardized Interval Scale (SIS) values and rank for each motivation by LC Cluster (4 cluster solution)

Characterization	**Cluster 1** Status, authority and inputs		**Cluster 2** Reciprocation between families		**Cluster 3** Obeisance of authority		**Cluster 4** Status, inputs and no authority	
Segment size	32%		34%		17%		16%	
Motivation	Rank	SIS Score	Rank	SIS Score	Rank	SIS Score	Rank	SIS Score
1. Maintain traditional village life	(2)	86.17	(1)	100	(2)	86.06	(5)	40.70
2. Respect authority of elders and chiefs	(3)	56.30	(5)	73.71	(4)	54.74	(8)	15.27
3. Respect requests of other families	(11)	2.46	(3)	95.97	(8)	15.68	(3)	89.68

4. Respect authority of priest/reverend	(8)	11.11	(10)	46.16	(3)	68.84	(9)	15.08
5. Improve status of the household	(1)	100	(8)	65.65	(5)	23.48	(1)	100
6. Improve my own status	(6)	28.03	(6)	71.40	(7)	16.88	(7)	16.93
7. Receive contributions to ceremonies	(7)	14.30	(2)	97.82	(1)	100	(10)	7.91
8. Receive contributions in times of need	(10)	5.66	(9)	56.97	(11)	2.14	(11)	3.98
9. Improve access to labour	(4)	37.82	(7)	68.41	(9)	11.34	(2)	92.53
10. Improve access to land	(5)	35.86	(4)	88.24	(10)	7.26	(4)	57.60
11. Receive support in a dispute	(9)	8.23	(11)	43.97	(6)	18.07	(6)	17.87

Table 7.7 presents for each segment the means of the socio-demographic and farm characteristics used as active covariates in the joint Latent Class cluster model. The ex-post ANOVA (Tukey t-tests) for inactive covariates suggests significant differences across the three clusters. The last three columns of Table 7.7 provide information about the significance of each covariate. The statistically significant covariates in the LC cluster analysis are: the number of dependent children and adults aged over 65 living in the household; the level of education of household head; the age of head of household; the total level of income enjoyed by the household; the level of remittance income received by the household; the indices of household wealth and farming assets; whether or not the household had access to a bank account, or farm land under freehold tenure; the amount of cash crop land enjoyed by the household; the number of person days of labour contributed by the household to food production, cash crop production and to inter-household transfers; the number of person days of labour the household is expected to contribute to inter-household transfers every year; whether the household accessed hired labour in the past year; whether the household is located

in an area with road access to the major cash market on the island; whether the household is a member of a farming co-operative; and whether the household has had access to agricultural extension training in the last twelve months. The ex-post ANOVA (tukey test) indicates that there are significant differences across the four clusters with respect to a number of the covariates (Table 7.7).

Table 7.7: Significant Covariates and Characteristics for Latent Class Clusters

Covariates	Cluster 1 32% (n171)		Cluster 2 34% (n181)		Cluster 3 17% (n91)		Cluster 4 16% (n87)				
	Mean		**Mean**		**Mean**		**Mean**		**Wald**	**p-value**	
Household labour endowment	2.72		2.73		2.39		2.38		5.47	0.17	n.s
Dependents	1.67	a,b,c	1.17	a	1.32	b,d	0.87	c,d	9.06	0.00	*
Education HOH	7.13	a	6.77		6.21	a	6.49		6.04	0.04	*
Age HOH	43.65	a,b	48.22	a,c	46.18	d	50.98	b,c,d	8.06	0.00	*
Income	353.58	a,b	340.26	c	250.07	a	216.26	b,c	2.43	0.02	*
Off-farm Income	108.14		68.35		80.25		62.60		3.29	0.47	n.s
Remittance Income	9.73	a	23.97	a,b	4.75	b,c	15.39	c	12.75	0.01	*
Wealth index	-0.05	a,b	0.06	a,c	-0.10	c,d	0.08	b,d	8.21	0.01	*
Farm asset index	-0.09	a,b,c	0.04	a	0.073	b	0.03	c	14.91	0.00	*
Bank account	0.62	a	0.77	a,b,c	0.56	b	0.62	c	16.40	0.00	*
Cash crop land	6.75	a,b,c	4.95	a,d	2.88	b	3.75	c,d	4.73	0.00	*
Freehold tenure	0.24	a,b	0.06	a,c	0.19	c,d	.012	b,d	27.75	0.00	*
HH labour for cash crop production	201.46	a,b	135.17	a,c	80.43	b,d	208.56	c,d	6.38	0.00	*
HH labour for food crop production	249.02	a,b,c	108.96	a,d	74.86	b,e	166.76	c,d,e	23.16	0.00	*
HH labour provided by hh to village	112.71	a,b	55.23	a,c,d	33.51	b,c,e	117.15	d,e	9.73	0.00	*
HH labour expected by village	89.39	a,b	96.27	c	69.96	a,c,d	102.72	b,d	9.26	0.00	*
Village labour provided to hh	10.56	a,b,c	12.05	a	5.736	b	10.44	c	24.17	0.45	n.s
Market labour hired by hh	6.95	a,b,c	2.08	a	2.14	b	2.86	c	7.40	0.00	*
Distance from market	27.05	a,b	20.81	a,b,c	24.87	a,b,d	31.54	a,c,d	6.79	0.00	*
HH received extension last 12 mths	0.10	a	0.28	a,b,c	0.12	b	0.09	c	22.32	0.00	*
Member of a farming co-op	0.28	a	0.26	b	0.23	c	0.08	a,b,c	20.51	0.00	*

Note: "n.s." indicates variable is not significant (α =/> 0.10) in the LC cluster analysis. An asterisk (*) indicates variable is significant at the $\alpha = 0.05$. Paired cluster means within a row with the same superscript letter (e.g 'a') are statistically different ($\alpha = 0.05$, post-hoc Tukey test). Cluster means within a row with no superscript letters are not significantly different.

The results revealed in Table 7.7 indicate that significant heterogeneity exists amongst households across the four clusters and in particular, in the allocation of labour to inter-household transfers. Households in Clusters 1 and 4 are the most divergent when comparing their mean scores for the demographic variables (size of household labour endowment; number of dependents; age of household head and household head education level) as well as the size of their income asset base (on and off-farm income; size of landholding; and access to freehold tenure).

Cluster 1, consisting of 32% of total respondents in the sample, is primarily motivated to obtain greater status for the household by submitting to the request of chiefs and elders to allocate resources to community activities (Table 7.6). They consider that *increasing the status of the household* the most important motivation (standardized to 100%) for allocating labour to extra-household labour activities. The motivation to *maintain traditional village life* (86%) is the second most important for respondents in this cluster and *respecting the authority of elders and chiefs* to request contributions by households, is third most important motivation (at 56%). Respondents in this cluster seem motivated to contribute household labour to obtain an increase in household status by supporting their village superiors and the institutions that empower them to direct labour towards the provision of public goods. However, they are less

interested in increasing their own personal status. Their respect for the authority of the chief does not extend to *respecting the authority of priests or reverends*, which scored 14% and was ranked 7th in importance; and to *respecting the requests of other families* (8th at 11%). The pursuit of tangible economic benefits is a second order motivation for households in this Cluster: *ensure access to labour* (4th at 38%) and *ensure access to land* (5th at 36%) are important, though the SIS scores for these motivations are substantially lower than those in the first places for this Cluster, or indeed in 4th and 5th place for other Clusters. The other economic benefits: *ensure contributions to household ceremonies (*9th at 8%)*; ensure support for the household in a dispute* (10th at 6%)*; and ensure access to food or money in times of need* (11th at 2%), are the least important motivation for investing household resources in the village labour market.

Considering the results of the ex-post ANOVA characterization of covariate mean results presented in Table 7.7, heads of households in Cluster 1 have the highest level of education, and the mean level of total income of households in Clusters 1 is the highest of all the 4 Clusters - more than 30% higher than for Clusters 3 and 4; whilst their level of off-farm income is also the highest of any Cluster, and more than 30% higher than the next Cluster (3). Households in Cluster 1 have on average far more cash crop land (6.75 ha) than households in the other 3 clusters; and are far more likely to possess land under freehold tenure (24%) than other households (particularly in Clusters 3 and 4). Households in Cluster 1 are industrious, devoting far more labour to food crop production (249 person days p.a.) than any other Cluster; and the second most of any cluster to cash crop production (201 days p.a.) and the village labour market (112 days

p.a.). Given their commitment to farming and size of their landholding, their motivation to obtain more labour is understandable, and therefore their interest in improving the status of their household in order to access it; as well as to maintaining the traditions and traditional authorities for commanding and re-allocating labour. In addition, given their relative wealth position, their interest in ensuring the efficacy of local authority in order to maintain law and order, and protect their assets from theft, is also understandable.

Cluster 2 is the largest (34% of respondents) and in contrast to Cluster 1, is less motivated by status, though they still place some importance on serving the social hierarchy. Principally, they are most interested in investing in the village labour market to secure access to social insurance and land for their families. Households in Cluster 2 place a high importance on *maintaining traditional village life* (standardized to 100%) as per Cluster 1, perhaps also reflecting the benefits provided by the village tradition of helping others, and reciprocation; however rather than improve access to labour, this cluster is motivated to ensure the maintenance of the tradition to provide reciprocal support in order to *receive contributions for ceremonies* (2^{nd} at 98%). As a result, members of his Cluster consider *respecting the request of other families* as very important (3^{rd} at 96%), perhaps given the more direct link between 'fundraising' for contributions and household requests, for this category of economic benefit, than those provided by *respecting the authority of chiefs and elders* (5^{th} at 74%) and *respecting the authority of priests and reverends* (10^{th} at 46%). Given the relatively lower endowment of land enjoyed by households in this Cluster when compared to households in Cluster

1, the motivation to *improve access to land* is considered important (4^{th} at 88%). Households in this Cluster are far less interested in status than the direct economic benefits of supplying labour to inter-household transfers, with *increasing my own status* (6^{th} at 71%) considered more important that *increasing the status of the household* (8^{th} at 66%). The additional private economic benefits of *ensuring access to labour* (7^{th} at 68%), *receiving contributions in times of need* (9^{th} at 57%), and *receiving support in a dispute* (11^{th} at 44%) are relatively unimportant to households in this Cluster, when compared to the high importance placed on *receiving contributions for ceremonies* and *improving access to land*.

The results of the ex-post ANOVA characterization of covariate mean results presented in Table 7.7 indicates that households in Cluster 2 are marginally less prosperous than households in Cluster 1. Their heads of households have the second highest level of educational attainment; and they have the second fewest number of dependents. They have slightly less total income than households in Cluster 1; and receive the highest amount of remittance income. They are the most likely to have a bank account. They are the most likely to have received farm extension advice (28%), the second most likely to be a member of a co-op (25%) and have access to the second most amount of land (though very little under freehold tenure). Yet they allocate much less labour to farming (cash crops and food), as well as to inter-household transfers, than households in Clusters 1 or 4.

These results indicate that households in Cluster 2 are relatively prosperous at a lower level of commitment to making contributions to the community – seeking support

for ceremonies, as well as more land if it is available. Households in this Cluster have perhaps failed to realize the importance of improving their household status in order to successfully compete for scarce community resources, as Cluster 1 households have. Therefore, they have not been as successful in amassing a landholding as large as households in Cluster 1. Perhaps as a consequence of this relatively lower rate of success in acquiring land, or as a factor contributing to it, households in this Cluster are less motivated to support the authority of Chiefs and Priests (and therefore increase their capacity to influence the allocation of inputs in the community).

Households in **Cluster 3** (17% of respondents) seek few private benefits for themselves, other than to receive contributions to family ceremonies (1st at 100%). The members of this Cluster are perhaps characterized by their obeisance to authority and efforts to maintain traditions. Households in this Cluster see that it is important seek to *maintain traditional village life* (2nd at 86%) by *respecting the authority of priests and reverends* (3rd at 69%) while *respect for requests of elders and chiefs* is the 4th most important motivation (at 55%). In comparison *respecting the requests of other families* (8th at 16%) is seen as far less important. There is a significant gap in the SIS scores between the first four places and the other motivations, reflecting how much more important these attributes are for members of this Cluster. However seeking to *increase the status of the household* (5th at 23%) and to *increase my own status* (7th at 17%) are relatively important to the household, as well as *ensuring support in a dispute* (6th at 18%), especially when compared to the importance given to the economic benefits

improving access to labour (9th at 11%), *improving access to land* (10th at 7%) and *receiving contributions in times of need* (11th at 2%).

Considering the results of the ANOVA characterization of covariate mean results presented in Table 7.7, households in Cluster 3 have the least amount of land, and the lowest level of commitment of any Cluster to farming activities. Households in Clusters 3 allocate only half the amount of labour to inter-household transfers expected of them. Households in Cluster 3 allocate far fewer days to inter-household transfers (33 days p.a.) than households in other Clusters. They also have heads of household with the lowest level of education of any Cluster. They receive the lowest amount of remittances, and have the second lowest level of total income of any Cluster and are the least likely to have a bank account; though they do receive the second highest amount of off-farm income among the four Clusters. In summary, households in this Cluster are relatively poor and dedicated to the observance of religious traditions, and village traditions, without investing much labour in strengthening social relationships with other households in the village, in order to access material and farm inputs in the future. They have little expectation of support from other families, other than to meet the financial cost of celebrating 'life cycle' ceremonies, supplemented by public good benefits associated with improved infrastructure and the maintenance of law and order. Households in this Cluster have little labour to invest in social capital formation, and therefore can expect few social and economic benefits from the village in return, despite their income poverty.

Cluster 4 is (with 16% of the sample population) highly motivated to improve the status of the household in order to secure direct economic benefits for the household, without placing much importance upon the authority of the social hierarchy, or giving much importance to the maintenance of tradition. Respondents in Cluster 4 consider that *increasing the status of the household* is the most important motivation (standardized to 100%) for contributing resources to the community. The significant importance given to *ensuring household access to labour* (2nd at 93%) and *ensuring access to land* (4th at 58%) indicates that they, as households in Cluster 1, understand the importance of improving the status of the household in order to attract scarce resources like labour and land. Unlike households in Cluster 1, they are less concerned with authority and tradition, with *maintaining traditional life* given the lowest SIS score for any Cluster (5th at 41%), as is *respecting the requests of elders and chiefs* (8th at 15%) and *respecting the requests of priests and reverends* (9th at 15%). In contrast, *respecting the requests of other families* (3rd at 90%) is seen as very important. The benefits of *receiving support in a dispute* have been identified by households in this Cluster as of equal importance to households in Cluster 3 *(*6th at 18%). *Receiving contributions to ceremonies* (10th at 8%) and *receiving contributions in times of need* (11th at 4%) are the least important motivations for this Cluster.

Considering the results of the ex-post ANOVA characterization of covariate mean results presented in Table 7.7, households in Cluster 4 have far fewer dependents (0.87) relative to Clusters 1 2 and 3; while the average age of heads of households in this Cluster (50.97 years) is also a higher than the means for the other Clusters (43 years

for Cluster 1; 48 years for Cluster 2; and 46 years for Cluster 3). Households in Cluster 4 have the lowest level of income (Vt 216,000 p.a.). They also have much less cash crop land than Clusters 1 and 2, with that land far less likely to be held under freehold tenure.

The mean scores indicate that households in Cluster 4 devote the most person days of labour per year to cash crop production (208 days p.a), and to inter-household transfers (117 days p.a.); and the second most of any Cluster to food crop production (166 days p.a.). Despite their high level of commitment to farming activities, only 8% of households in Cluster 4 were members of a farming co-operative; and only 10% received any support from an agricultural extension officer. Households in Cluster 4 are also far more likely not to have road access to market than households in the other clusters, with almost 50% of them in this category. Households in Cluster 4 can therefore be characterized as relatively older, poorer, dedicated to farming on less land, and expecting to receive little support from others, compared with households in other Clusters. Households in Clusters 3 and 4 have few assets, but very different labour allocation strategies and motivations for engaging in village, and farming, activities.

7.6 Discussion

Cluster 1 (32% of the sample) has a strong commitment to obtaining the social advantages associated with higher status through the maintenance of the power of the social hierarchy over household labour allocation decisions. In addition, members of this cluster supply a substantial amount of family labour to inter-household transfers, as well as to cash crop production and production of food for the family. They are also the

most prolific users of waged labour and second most of village labour. Households in this Cluster have the highest farming incomes and off-farm incomes of all the Clusters, as well as access to more land. Their heads of household have the highest education levels. Members of Cluster 1 can be viewed as relatively privileged, though industrious: working hard in pursuit of the advantages of that additional effort on-farm, as well as investment of family labour in inter-household transfers, can bring. Their overall level of commitment to village traditions and supporting local authorities to redirect labour to supplement their own, is strong.

Cluster 2 (34% of the sample) households invest considerably less in village labour activities – less than half the amount invested by households in Cluster 1 - to improve their future income security as well as privileged access to land. They enjoy a level of farm income and off-farm income only slightly below households in Cluster 1, though with less cash crop land; yet they invest less than half the amount of hours in food crop production, and almost half the amount of hours in cash crop production. Households in this Cluster have far less time for the maintenance of village traditions or authority than those in Cluster 1. Their commitment to other families is a far higher motivating factor than their commitment to chiefs or priests. Perhaps as a consequence, they are far less concerned with securing higher status for themselves or their families; and look to other families for contributions to ceremonies, rather than invest family labour in the community activities in pursuit of status, land and labour.

Despite their purported commitment to supporting village traditions, households in Cluster 3 (the third largest with 17% of the sample) contribute less labour to inter-

household transfers than households in any of the other three clusters. They also maintain a similarly low rate of supply of labour to cash crop and food crop production. They have the smallest landholding size and the least amount of family labour relative to their dependents. They score the lowest on the wealth index, and receive the second lowest for farm income. However, they receive the second highest amount of off-farm income of the four Clusters and therefore may invest what available labour they have, in this activity. They are highly motivated to respond to the requests of priests, other families and chiefs, but seek few economic benefits other than contributions to ceremonies. Given their low supply rate of investment of family labour on-farm, in favour of off-farm activities, it is understandable that households in this Cluster are not highly motivated to supply labour to inter-household transfers, or to secure access to additional land and agricultural labour. Households in Cluster 3 have largely withdrawn from the traditional method of generating an income from semi-subsistence production, in favour of one based on off-farm income.

Households in Cluster 4 (with the fewest number of households at 16%) are most committed to supplying family labour to inter-household transfers. This is understandable given their low land endowment but high labour endowment, relative to their number of dependents. They receive the lowest level of income from farm and off-farm activities of any of the four clusters; yet they invest the most amount of labour in cash crop production, and the second most in food crop production. Households in this Cluster continue to struggle to generate an income from cash crop production given they face high marketing costs - as a result of being located the furthest distance from market

(among the four Clusters) - and have the lowest rate of access to farm extension advice, as well as the lowest rate of membership of farming co-operatives. They are highly motivated to invest family labour in order to strengthen positive social relations with other households, and secure access to village labour, land and additional income benefits that these may bring.

7.7 Conclusion

This chapter contributes to the existing agricultural development literature by using a unique methodology, a BW scaling experiment, to identify the most important social and economic benefits that result from supplying family labour to inter-household transfers. It identifies that households are motivated to supply labour to ensure the production of public goods, to obtain higher levels of social status, and to access additional inputs of land and labour. A lower order of motivation is to obtain material support for the celebration of customary ceremonies. In contrast to the literature on 'risk pooling' (i.e. Coate and Ravillion 1993) households are not highly motivated to secure access to future material support in times of need. However, the LC analysis indicates there is significant heterogeneity across the sample.

These results indicate that households are highly motivated to supply family labour to inter-household transfers in order to secure a range of potential social and economic benefits, which provide them with significant utility. As a result of these utility benefits, family labour invested in village group labour activities and labour exchange is not surplus, and therefore not readily available to be reallocated to

intensifying cash crop production activities. Smallholders may be incentivized to reallocate labour from inter-household transfers to CCI if the marginal returns to labour of this reallocation are positive; however a comparison of the returns to labour between intensive cocoa production, and village labour activities, may not be an easy endeavor given the likely time delay between an initial investment in social capital accumulation and a household securing preferential access to common village resources.

Despite the difficulty of comparison, development interventions aimed at increasing the supply of labour to cash crop production activities should consider the competing social and economic benefits provided to households by village labour activities, and the impact that these will have on the rate of labour supply. Interventions aimed at improving the enabling environment for investments in cash crop production - such as improving the efficiency of rural land and labour markets, improving the efficiency of transport infrastructure for marketing of cash crops, and improving the efficiency of public good provision such as ‘law and order’ to rural areas - may help increase the incentives for households to invest labour in CCI.

8 Impact of the assignment of village labour on farm household labour supply responses

8.1 Introduction

This chapter investigates the two remaining subsidiary research questions: 'what household endowment factors are significantly correlated with the assignment of supplementary labour by village authorities'; and, 'what is the impact of the assignment of supplementary labour on the supply of family labour to cash crop production, and other on and off-farm activities?' In order to investigate the first question, the chapter uses OLS regression analysis to identify significant positive and negative correlations between the pertinent household factors identified in Chapter 4, and the dependent variable: the exogenous assignment of village labour to the household. In order to investigate the second, the chapter employs Heckman's (1976) two-stage estimator to develop a robust measure of the labour supply response of the household, to estimate the impact of the exogenous assignment of village labour on the household's supply of labour to cash crop production, food crop production, village labour activities, off-farm income generating activities, as well as the use of hired market labour. The chapter also uses a robust variance covariance estimation (VCE) method developed by White (1980) to reduce error variance associated with heteroskedasticity resulting from conditional expectations such as those imposed by positive and negative values of the dependent variable (Huber 1967; White 1980). This improves the efficiency of our estimation.

This chapter provides an empirical method of settling the debate highlighted in Chapter 3 regarding the impact of inter-household transfers on smallholder agricultural production: whether assignments of labour assist households to access supplementary labour to address temporary labour supply deficits, or simply substitute family farm labour from select households, and therefore result in a net reduction in agricultural production. It also provides an insight into the relative returns to household labour offered by each competing farm and non-farm activity, by identifying how assignments of labour effct household labour supply responses. If village labour is assigned to assist labour deficit households obtain higher marginal returns from surplus village farm labour at times of peak demand (i.e. the harvest), one would expect household's assigned labour to increase the supply of labour on-farm. Similarly, if cash crop production offers the most favourable returns, the impact of an exogenous assignment would increase the total rate of supply of labour to cash crop production. However, if the marginal rate of return to off-farm labour exceeded the rate of return to both cash and food crop production, the impact of an exogenous assignment of labour will increase the rate of supply of labour off-farm, and maintain or reduce the amount of labour supplied to on-farm activities.

This information is important to predicting how households will respond to the adoption of labour-intensive production methods associated with CCI, by investigating how households allocate surplus labour. Therefore, this chapter provides the empirical evidence necessary to inform rural development programmes designed to improve household income and utility levels amongst smallholders in SIDS: whether to encourage households to increase the supply of labour

to cash crop production, or another income generating activity. It also helps us understand what utility benefits households derive from assigned village labour: whether it is a supplemental form of farm labour directed to households in deficit; or whether it enables privileged households to release family labour from farm production in order to pursue better income generating opportunities off-farm.

The next section presents a summary of the literature identifying the factors most important to understanding smallholder household labour supply responses in the international context, and in PICs. The subsequent two sections explain results of the data analysis method and explore the implications of these results for policy-makers.

8.2 Factors affecting smallholder labour supply responses

The agricultural development literature identifies a number of factors influencing the supply of household labour to on-farm and off-farm activities. Semi-subsistence smallholder households have been found to be subject to considerable constraints upon their supply of labour to income generating activities (Barzel and McDonald 1973; Barrett et al. 2000; Berg 1961; de Janvry et al. 1991; Reardon et al. 2000). Rural development interventions commonly aim to increase household income by releasing household labour from subsistence production in favour of higher income generating activities, such as cash crop production and off-farm income generation (Barzel and McDonald 1973; Binswanger and Rosenzweig 1986; Berg 1961; Blaikie

et al. 1994; Campbell 1990; de Janvry et al. 1991; Ellis 1981; Hymer and Resnick 1969; Lanjouw 2001; Reardon et al. 2000 etc).

Many rural development interventions aim to support households trapped in semi-subsistence production due to persistent input and output market failures (de Janvry et al. 1991; Ellis 1981; Timmer 1998) or high rates of exposure to weather and price related risks (Blaikie et al. 1994; Campbell 1990) which reduce incentives for supplying labour to cash crop production. Other programs aim to reduce the barriers inhibiting households from shifting their supply of labour to non-farm income generating opportunities, such as high entry costs and a scarcity of opportunities in rural areas (Barzel and McDonald 1973; Berg 1961; Dalton 1961; Ellis 1981; Estudillo and Otskuka 2008; Hymer and Resnick 1969; Lanjouw 2001; Reardon et al. 2000).

Farm household models are commonly used to understand how environmental and endowment factors impact on household labour supply responses. These models tend to assume that farm households allocate time between competing activities, e.g. subsistence production, cash crop production and waged labour, depending on relative price incentives and household preferences for optimizing their utility (de Janvry et al. 1991; Key, Sadoulet and de Janvry 2000). These models commonly find that an increase in the shadow wage for on-farm production would encourage the household to increase the supply of labour to on-farm activities by supplementing household labour with market labour (Sumner 1982; Huffman and Lange 1989; Kamau et al. 2001). Similarly, increasing returns to off-farm labour would encourage households to shift family labour from on-farm to off-farm income generating activities, where they are able

to overcome the entry costs, in order to lift household utility levels (Reardon 1997; Reardon et al. 2000)

Household endowment levels impact upon the incentives to supply household labour to on-farm and off-farm activities. The size of household landholdings can have an impact on their capacity to supply labour to farm and non-farm activities, with larger farmers usually dedicating a greater proportion of their land and labour to cash crop production than small farmers (Barrett 1993; Fafchamps 1992; Jayne et al. 2003). Households with a larger labour endowment have also been documented dedicating more labour to cash cropping than smaller families (Benjamin 1992). The age of household head and number of dependents supported by the household also affects their capacity to supply labour to on-farm activities, because of the impact of age on the efficiency of labour, and increased amount of labour required for home care duties (Benjamin 1992; Evenson 1978; Goetz 1992).

Educational attainment has been identified as one factor associated with increased farm productivity, reducing the amount of labour needed to be supplied to on-farm activities whilst also enabling labour to migrate to off-farm employment and self-employment (Dercon 1998; Carter and May 1999; Barrett and Reardon 2000; Reardon et al. 2000; McPeak and Barrett et al. 2001). Similarly, investing in the development of a household's human capital – such as the capacity to utilize productivity enhancing technologies - could lead to increased demand for household and supplementary on-farm labour (Bedemo 2013).

Possession of a bank account improves the incentives for households to invest additional labour in on-farm production, by providing improved incentives to generate and safely store surplus income, as well as by enabling households to acquire the capital assets required to improve the efficiency of on-farm production (Binswanger et al. 1993; Dercon 1998; Eswaran and Kotwal 1986; McPeak and Barrett 2001; Sadoulet and de Janvry 1995).

Physical proximity to market also helps to incentivize households to invest in cash crop production, by reducing the transaction costs associated with transporting goods to market; however it also enables a household to shift labour into off-farm employment (Smith et al. 2001; Lanjouw 2001).

Increasing access to agricultural extension advice also helps to increase the efficiency of farm labour, and provides an incentive to increase on-farm production. Membership of a co-operative can help reduce the transaction costs associated with marketing cash crops, as well as improve access to extension advice (Barrett 2008; Bernard and Spielman 2009; Lepar et al. 2003).

Farm households are presumed to be able to access market labour to supplement or substitute household labour in response to demand from on and off-farm production (Benjamin 1992). However, rural labour markets are commonly affected by a range of difficulties, including high search, supervision and other transaction costs associated with accessing market labour; institutional interventions which artificially lift or lower wages; differences in the productivity rates and returns to household and market labour; and the impact of demand for

labour from off-farm employment, on wages and the availability of labour (de Janvry et al. 1991**;** Singh et al. 1986). In these cases, the capacity for farm households to access supplementary labour supplied through the market is significantly curbed. Indeed, relative endowment levels have been found to have an effect on the capacity of households to satisfy their demand for labour from rural labour markets, under conditions of market imperfection, with households at the top of the socio-economic distribution in a community enjoying relatively greater access to non-family labour (Le Fave and Thomas 2014).

Smallholder communities commonly develop their own institutions to enable them to reduce the impact of market imperfections, and exposure to risk, on the marginal returns to farm labour (Berry 1989; Carter 1999; Dercon 1998; Ellis 2000; Fafchamps and Quisumbing 1998; Townsend 1994). For example, the development of norms and institutions for redistributing labour inputs between households within small farming communities, such as through labour exchanges, have enabled smallholders to overcome the impact of significant labour market imperfections on their access to supplemental inputs of farm labour during times of peak demand (Erasmus 1956; Guillet 1980; Metraux 1971; Horowitz 1960; Macfarlane 2010; Moore 1975; Suehara 2006; 2010). Households are presumed to participate in labour exchanges on the basis of equivalent reciprocation, with participants receiving an input of village labour equal or equivalent to the volume of labour previously supplied (Macfarlane 2010; Suehara 2006). However, it has been observed that elite capture of scarce resources is a common feature of group management in semi-subsistence communities, including of labour (Beteille 1983;

Dasgupta 2000a; Glaeser et al. 2002; Goudner 1960; Townsend 1994). Indeed, differences in the relative social and economic asset positions among households can enable powerful members of the community to use their influence to capture a disproportionate share of the benefits of those resources (Berry 1997; Gilligan 2004; McLean 1992; McFarlane 2010; Ogilvie 2003; Schieffelin 1980). As a result, the redistribution of surplus household labour through village exchanges may not operate to secure higher net utility gains for the entire community - by shifting labour to households offering superior marginal returns to labour – but to secure additional advantages for elite households.

Among the ranked smallholder societies of the SIDS in Melanesia and Polynesia in the Pacific Islands, the assignment of household labour has been identified to be motivated by social obligation and tribute (Crocombe 1987) as well as considerations of the extending political influence (Gregory 1982; Sahlins 1963; 1972) rather than by balanced reciprocation, or by achieving social welfare gains for the community. Similarly, rural households in Vanuatu have been documented to transfer labour to inter-household transfers as a consequence of social obligation, rather than like reciprocation (Huffman 2005; Malvatumauri 2013; Weightman 1989; Welegtabit and Longman 2006). The assignment of supplementary labour to households in Malekula may similarly be driven by consideration of relative endowment levels, rather than balanced reciprocation or marginal utility.

Extra-market transfers of income, such as remittance income or additional labour, can help households overcome the barriers imposed by malfunctioning or missing factor markets, by

freeing them to allocate household resources to activities where marginal returns are highest; though they can also provide an incentive to withdraw labour from both farm and non-farm activities, by satisfying income needs (Barrett et al. 2001; Damon 2009). Households with the fewest agricultural assets are likely to invest the most labour into on-farm activities owing to an absence of labour saving inputs, and are typically also least able to diversify into off-farm activities because they are unable to meet the initial entry costs (Barrett et al. 2000; Canagarajah et al. 2001; Reardon 1997; Reardon et al. 2000).

Agriculture on Malekula depends largely on family labour and land held under tribal tenure, with households possessing limited access to productivity enhancing inputs such as farm machinery, fertilizers or improved planting material. Smallholders satisfy their consumption needs through a mixed strategy of subsistence root-crop based food production, supplemented by sales of tree crops (cocoa and copra) for cash, inter-household transfers of labour and other resources, and off-farm income generating activities (VNSO 2010; Weightman 1989). Over the past decade, this strategy has come under increasing pressure as rural households face rising demand for income to meet rising school, communication and transport costs (AusAID 2007; VNSO 2010). As a result, households have been encouraged to adopt new labour-intensive cash cropping strategies (ACIAR 2009). However, rural household income from cash crops has declined relative to income from subsistence agriculture and off-farm income generating activities, as a result of shrinking prices for copra (VNSO 2007; VNSO 2012). This has encouraged the Government of Vanuatu to assist smallholders to adopt cocoa CCI (DARD

2009). However, a number of potential barriers to adoption – including inter-household transfers – have been identified.

In the next section, the study first presents descriptive information on the factors affecting Malekula's smallholder household labour supply, including the mean number of person days of labour supplied by households both amongst those assigned and not assigned village labour, to cash crop production activities, food crop production, off-farm production, engagement in village labour activities, and the total number of person days of hired labour households' access. It presents the mean household scores for a number of factors previously identified in the literature as having an influence on the labour supply responses of smallholder households: the size of the household labour endowment; the number of household dependents; the age of household head; the education level of the household head; the proximity of the household to the market; household possession of labour saving farm assets; household income levels and access to credit, including remittances; the household's possession of a bank account; membership of the household in a farm co-operative; and the household's receipt of farm extensive advice.

8.3 Description of sample

Key informant interviews and pre-testing of the household survey in Malekula identified that the number of person days of labour households were expected to contribute to inter-household transfers, was an important factor affecting the rate of supply by households. During the implementation of the survey instrument, each household surveyed was asked to provide: a)

an outline of the total number of person days (equivalent to 8 hours) of labour supplied to on-farm activities (food and cash crop production) as well as to non-farm activities (village labour activities and engagement in off-farm income generating activities for the last month) as well as the total number of person days of labour hired from the market; and b) whether they had received an assignment of village labour in the last 12 months. An assignment of village labour is defined here as *the exogenous assignation of one person day (equivalent to 8 hours) of non-household labour to another household by village authorities, to be employed in a farming activity at the discretion and direction of the recipient household head*. This method identified that 146 households had received an assignment of village labour during the study period.

The descriptive statistics for those households that received an assignment of village labour in the last 12 months and those who did not, are presented in Table 8.1. A t-test was used to identify significantr factors.

Table 8.1: Descriptive statistics for households assigned and not assigned village labour

	All households (n=530)		Assigned village labour (n=146)		No village labour (n=384)		**p-value**	Signf.
Indicator	Mean	Standard deviation	Mean	Standard deviation	Mean	Standard deviation		
Household labour endowment (count)	2.62	1.67	2.63	1.86	2.60	1.61	0.84	
Household Dependents (count)	1.31	1.37	1.40	1.46	1.28	1.33	0.34	
Age of household head (years)	46.87	13.28	45.26	12.17	47.86	13.60	0.07	+
Household head education (years)	6.81	2.57	7.24	2.91	6.55	2.52	0.01	**
Cropland operated by household (hectares)	4.98	5.67	6.27	5.86	4.49	5.52	0.00	**
Plots held under freehold tenure (%)	13.21	33.91	11.01	31.32	14.13	34.83	34.71	
Household farm assets (index)	0.00	0.42	0.01	0.43	-0.01	0.42	0.68	
Households wealth assets (index)	0.00	0.52	-0.01	0.47	0.00	0.54	0.77	
Household income (1000 Vatu/year)	323.48	410.16	440.40	543.18	278.89	322.74	0.00	**
Household off-farm income (1000 Vatu/year)	82.29	270.24	134.57	391.47	62.41	203.49	0.01	**
Household remittance income (1000 Vatu/year)	14.67	35.50	10.89	29.48	16.10	37.47	0.13	
HH member has a bank account (%)	65.91	47.51	69.21	46.33	64.61	47.93	0.32	
HH labour expected by village (days/year)	90.59	45.82	102.84	39.09	85.93	47.36	0.00	**
HH labour provided to village (days/year)	80.21	81.77	96.03	102.65	74.19	71.51	0.01	**
Village labour provided to hh (days/year)	10.22	30.56	37.10	49.02	0.00	0.00	0.00	**
HH labour for cash crop production (days/year)	157.78	187.34	134.45	119.49	168.63	334.46	0.23	*
HH labour for food crop production (days/year)	159.21	291.79	153.02	109.50	159.59	209.58	0.72	
Market labour hired by hh (days/year)	3.79	13.60	9.86	17.962	1.48	10.68	0.00	**
Distance from HH to market (km)	25.28	14.23	23.76	13.30	25.86	14.55	0.13	
HH accessed extension advice last 12 mths (%)	16.41	37.12	16.41	37.20	16.43	37.12	0.99	
HH is member of a farm co-operative (%)	23.21	42.31	32.22	46.94	19.81	39.91	0.01	**

Significance: ** p<0.01, * p<0.05, + p<0.1

Table 8.1 reveals that households assigned village labour have, on average, a younger head of household than those who are not assigned labour; and that village labour is more likely to be assigned to households whose heads have obtained a higher level of education. This table also indicates that households assigned village labour possess a much larger area of cropland than households that do not – almost 50% more.

Table 8.1 indicates also that households assigned village labour have a higher level of total and off-farm income, than those households that do not receive village labour. This table also shows that households that are assigned village labour reside, on average, in villages which expect a higher number of inputs of village labour from their inhabitants than the mean; and that further, households that are assigned labour reside, on average, in villages where households do actually supply more village labour than the mean. It reveals that households assigned village labour receive, on average, 37 person days a year - though with a standard deviation of 49 person days. Most interestingly, households that do receive village labour invest fewer person days of household labour in cash crop production than those who don't; and that they hire far more labour than households who do not. They are also far more likely to be a member of a farm co-operative. The correlation between these factors and the assignment of village labour is explored in the next section.

8.4 Probit analysis of the household factors which influence the assignment of village labour

Of the 530 households participating in the survey, 497 households were able to be observed in the results of the regression in Table 8.2. The attrition of 33 households from the sample was the result of missing data for a small number of households across the 14 indicators constructed in order to carry out the regression.

Table 8.2: Relationship between the assignment of village labour and household factors

Dependent variable (assignment of village labour) =1/0	
N=497	
Household labour endowment (count)	0.01
	(0.039)
Number of household dependents (count)	0.04
	(0.046)
Age of household head (years)	-0.00
	(0.005)
Household head education (years)	0.05+
	(0.028)
Cropland operated by household (hectares)	0.02*
	(0.011)
Plots held under freehold tenure (%)	0.11
	(0.199)
Household farm assets (index)	-0.02
	(0.153)
Household income (1000 Vatu/year)	0.00
	(0.000)
Household remittances (1000 Vatu/year)	-0.00+
	(0.002)
HH member has a bank account (0/1)	-0.10
	(0.152)
HH labour expected by village (days/year)	0.00**
	(0.001)
Distance from HH to wharf (km)	-0.00
	(0.000)
HH accessed extension advice last 12 mths (0/1)	-0.45*

	(0.196)
HH is member of a farm co-operative (0/1)	0.43**
	(0.161)
Constant	-1.27**
	(0.407)
R-Square	0.0586
Chi-2	33.39

Standard errors in parentheses
** p<0.01, * p<0.05, + p<0.1

The results presented in Table 8.2 indicate that the education level of the household head, size of household landholding, value of remittances, person days of village labour of the household, receipt of agricultural extension advice and membership of a farm co-operative, are all factors significant to the assignment of village labour to a household.

Table 8.2 indicates that the education level of the household head and size of household landholding are positively correlated with the assignment of village labour to the household. This result can be interpreted to indicate that households headed by relatively well educated adults are more effective at persuading other households to provide labour; or perhaps that their education is a mark of social status, which attracts labour to the household.

The significance of a positive correlation between the assignment of village labour and the size of the household landholding, might be interpreted to indicate that households with more farm land have greater need of supplementary inputs of non-family labour in order to effectively utilize their land resources; and that village authorities are responding to this relative need by assigning labour to these households. Alternatively, households that are well-endowed with land resources might also be among the more influential households with regards to village affairs, given that their relative size of landholding indicates that they or a relative, managed to secure

additional land sometime in the past. Their ability to increase the size of their landholding might also be an indication of increased influence over the assignments of village labour by local authorities.

The amount of labour expected of the household by the village is significantly correlated with the assignment of village labour to the household. This result can be interpreted to indicate that villages in which households are expected to supply more labour to group activities are also villages in which households can expect to access assignments of village labour at a higher rate. Similarly the strong positive correlation between household members of a farm co-operative and their assignment of village labour, perhaps indicates that membership of a co-operative is an indication of higher status or that members of co-operatives are active in exchanging labour in order to assist their members address deficits in household labour supply rates at times of peak demand.

The strong negative correlation between access to farm extension advice in the last 12 months and the assignment of village labour is difficult to interpret. Perhaps households accessing farm extension advice are less in need of assignments of labour from the village, or are seen as less in need, and are therefore assigned less supplementary labour; or perhaps they are more likely to be located in villages which are more dedicated to cash cropping and therefore, have less surplus labour to contribute to inter-household transfers.

In the next section, we measure the impact of the assignment of village labour on the supply of household labour to cash crop production, food crop production, village labour

activities, off-farm income generation and access to hired labour. The results of this analysis are critical to determining the relative returns to labour offered by each activity and therefore, whether CCI should be prioritized in a rural development intervention in Malekula, and in SIDS with a similar demand for household labour from village authorities.

8.5 Impact of the assignment of village labour on household labour supply

Table 8.3 uses the two-step method of OLS regression analysis (Heckman 1980) described in Chapter 4 to compares the correlation between the assignment of village labour and smallholder household labour supply rates to on and off-farm activities, as well as a number of other factors identified in the literature as having an important influence on household on-farm and off-farm supply rates. These factors include household endowments such as the size of the household labour endowment; number of dependents; age of household head; education level of the household head; proximity to market; the possession of wealth items and labour saving farm assets by the household; household income levels; size of the household land endowment; the value of remittances received over the last 12 months; membership of a farm co-operative; receipt of farm extensive advice during the last 12 months; and the possession of a bank account. It includes the distance of the household from the local market for cash crops; whether or not the household holds land under freehold tenure; and the number of days of labour that households in that village are expected to contribute to village labour activities. Most importantly, it includes whether or not that household was assigned village labour in the last twelve months.

Table 8.3 displays the correlation between these household variables and five different dependent variables: the total person days of household labour supplied to **cash-crop production**, with is defined as the production of cocoa, copra or other cash crop, destined for sale; the total person days of household labour supplied to **off-farm employment**, which is defined as any waged activity; the total person days of **hired labour** procured by the household from the rural labour market; the total person days of household labour supplied to **village inter-household transfers**, including maintenance of village infrastructure and assisting private households with farming activities – as directed by village authorities; and the total person days of household labour supplied to **subsistence food production** for the household.

Table 8.3: Impact of the assignment of village labour on household labour supply to farm and non-farm a ctivities

	Traded Labour			Non-Traded	
VARIABLES	Cash crop	Off-farm	Hired in	Village	Subsistence
N=497					
Household labour endowment (count)	12.82	-0.99	-0.11	-0.11	-4.63
	(8.488)	(8.097)	(0.437)	(2.661)	(9.591)
Age of household head (years)	-22.44*	10.97	0.12	-3.44	-38.38+
	(9.127)	(21.486)	(1.048)	(5.473)	(21.361)
Household head education (years)	4.43**	1.57	-0.12	1.27*	5.61*
	(1.150)	(2.669)	(0.116)	(0.625)	(2.347)
Cropland operated by household (hectares)	-45.88**	30.39	0.74	-13.09*	-64.75**
	(15.605)	(24.164)	(1.258)	(6.521)	(24.928)
Plots held under freehold tenure (%)	-14.42*	0.62	0.21	-3.95	-23.24*
	(6.430)	(10.360)	(0.519)	(2.846)	(10.609)
Household farm assets (index)	67.13**	92.81**	1.28	-12.82	21.78
	(17.059)	(35.385)	(1.502)	(8.365)	(21.034)
Household income (1000 Vatu/year)	-0.23*	-0.02	0.01	-0.12*	-0.47*
	(0.108)	(0.240)	(0.011)	(0.051)	(0.199)
Household remittances (1000 Vatu/year)	3.50**	0.26	-0.04	1.00*	4.93**
	(1.327)	(1.875)	(0.091)	(0.481)	(1.890)
HH member has a bank account (0/1)	92.74**	53.01	1.46	15.85	130.98+
	(26.919)	(59.755)	(3.074)	(17.606)	(68.633)

HH labour expected by village (days/year)	-3.85**	-0.38	0.06	-0.76	-5.54**
	(1.279)	(2.339)	(0.112)	(0.606)	(2.135)
Distance from HH to wharf (km)	0.00**	-0.00	-0.00	0.00**	0.00**
	(0.001)	(0.001)	(0.000)	(0.000)	(0.001)
HH accessed extension advice last 12 mths (0/1)	310.50*	-33.76	-5.64	104.68+	497.98*
	(145.025)	(233.748)	(11.585)	(57.003)	(195.862)
HH is member of a farm co-operative (0/1)	-386.28**	-27.76	4.29	-122.57*	-498.63**
	(119.557)	(225.121)	(10.833)	(53.059)	(171.057)
HH assigned village labour	-45.78**	58.48+	6.95**	8.81	-25.41
	(17.578)	(33.124)	(1.553)	(9.355)	(16.380)
Inverse Mills Ratio (IMR)	-1,181.27**	-15.11	12.46	-407.77*	1,773.00**
	(415.387)	(687.049)	(33.730)	(174.022)	(673.142)
Constant	2,074.90**	-172.81	-20.23	672.78*	3,107.93**
	(734.935)	(1,172.099)	(58.984)	(302.192)	(1,157.116)
R-2	0.0412	0.135	0.100	0.213	0.0724
F	13.73	3.502	3.592	9.851	7.732

Standard errors in parentheses
** p<0.01, * p<0.05, + p<0.1

Whilst Table 8.3 indicates a number of significant results which echoes findings elsewhere in the literature, this Table presents two central findings regarding the impact of the assignment of village labour on household labour supply responses: 1) that the impact of the assignment of village labour on the supply of household labour to cash crop farming activities is significantly negative; and 2) the impact of the assignment of village labour on off-farm employment activities is significantly positive. Indeed, the impact of the assignment of village labour, as illustrated in Table 8.3, is to reduce the total number of person days of labour supplied to cash crop production per year, by an average of 45. In contrast, households which received an assignment of village labour increased their off-farm income by 58,000 Vatu, or 70% of the mean for this income source. This result supports the finding (in Table 8.1) that households receiving village labour have an average off-farm income of higher than 134,000 Vatu; while those not receiving an assignment of household labour earned only 62,000 Vatu from off-farm

sources. The impact of the assignment of village labour on food crop production was not significant with the allowable parameters for standard errors, though the results also indicate a negative relationship. Those households which were assigned village labour were also more active in accessing labour through the formal labour market: households which received the assignment of village labour hired an additional 6.8 person days of labour.

Table 8.3 indicates that an increase in the number of person days of labour the village expects households to contribute to its activities decreases the amount of labour invested in on-farm activities. This indicates that while this institution may help some households supplement or substitute their supply of family labour at times of peak demand, it reduces the overall supply of household labour to farming activities: indeed each additional day of labour expected per week reduces the average number of person days of labour supplied to on-farm activities by approximately 10 per year.

Interestingly, the negative relationship suggested in Table 8.3 between household income and the allocation of labour to cash and food crop production and inter-household transfers would seem to reinforce the finding that alternative sources of income to farm income, are becoming increasingly important; and that therefore, CCI is not necessarily the most effective means of improving household income levels. The positive correlation between remittance income and the allocation of labour to farm activities perhaps also indicates the difficulty in deriving a sufficient income from on-farm production activities.

The results presented in Table 8.3 also confirm the impact of the age of household head on dampening the supply of household labour to on-farm production activities and the positive impact of the level of educational attainment on the supply of household labour to farm activities, identified elsewhere in the literature, though Table 8.3 reveals no significant relationship between years of education and off-farm income generation.

The large increase in family labour invested in farming activities by those households with a bank account (indicated in Table 8.3) confirms the findings in the literature that bank accounts offer households a strong incentive to generate surplus income. The positive correlation between ownership of labour productivity enhancing farm assets and supply of labour to on-farm activities confirms the increased incentives offered by these items to supply labour on-farm. The significant positive impact of the receipt of extension advice on the rate of investment of labour in on-farm activities should be encouraging for national authorities; though the negative impact of the membership of a farming co-operative on the supply of labour inputs to on-farm activities, perhaps indicates that these institutions divert labour from farming, rather than incentivise farm labour.

The strong negative relationship (revealed in Table 8.3) between the amount of land managed by the household and their supply of labour to on-farm activities is perhaps contrary to the findings of other studies. Similarly, the negative correlation between access to freehold tenure and the number of inputs of labour supplied to on-farm activities seems contrary to the

literature on the supposed incentives provided by secure land tenure to investment in cash cropping.

8.6 Conclusion

This chapter reveals the significant impact that the assignment of village labour has on the supply of household labour to farm and non-farm activities. Households receiving an assignment of village labour invest less labour in cash crop production, and enjoy higher levels of off-farm income. This result indicates that the assignment of village labour enables households to substitute their cash crop labour with village labour, in order to re-direct household labour to off-farm income generation activities. Further, this indicates that non-farm income generating activities offer higher marginal returns to labour than on-farm activities. Subsequently, the assignment of village labour enables select households to increase their households income levels by engaging in more lucrative, off-farm employment.

One should interpret this result to indicate that assignments of village labour are not designed to assist members of rural communities access supplemental farm labour with which to overcome deficits in peak demand for labour, but to provide privileged households with substitute labour designed to release them from on-farm work and obtain higher returns to labour off-farm.

Subsequently, rural development interventions aimed at improving rural income levels among smallholders in SIDS should not prioritize CCI strategies - all things remaining equal -

given the lower returns to cash crop labour relative to off-farm employment. Future rural development interventions should prioritize programs that facilitate increased participation in off-farm labour markets by rural households, or address the range of infrastructure and institutional factors which reduce the returns to cash crop labour.

9 Summary and Discussion

9.1 Introduction

This study sought to answer the principal research question: are CCI strategies an effective strategy for assisting rural smallholders to improve their livelihoods? It sought to answer this question by investigating five research questions: 1) Do households respond to increased returns to cocoa labour by adopting cocoa CCI strategies? 2) What social and economic benefits are the most important factors in explaining why households supply labour to inter-household transfers? 3) Can distinct clusters or sub-populations be identified to distinguish how and why households supply labour to inter-household transfers? 4) What household endowment factors are significantly correlated with the receipt of assignments of supplementary labour? And 5) what is the impact of the assignment of supplementary labour on household labour supply responses to both on and off-farm income generating activities?

This chapter summarises the major findings of this study for each of these research questions, and subsequently, for the key research question. It then presents the key policy challenges raised by these results, and proposes some recommendations for policy-makers. It also acknowledges the limitations of this study and outlines some areas for future research.

9.2 Do households in the sample population increase their supply of family labour to cash crop production in response to increased returns to cash crop labour?

Chapter 6 calculates the returns to effort provided by cash crop production (cocoa andcopra) under current conditions and those offered by cocoa CCI (using the IPDM method to improve yield and reduce pre-harvest losses) and finds that smallholders on Malekula have a significant incentive to redirect labour from copra to cocoa production. Smallholders on Malekula could achieve significantly higher returns to labour through the adoption of yield increasing IPDM practices. The results indicate that the additional number of person days of labour required to fully adopt cocoa CCI is an important consideration, given the non-effectiveness of partial adoption owing to the high frequency of contagion of the black pod disease, and likelihood of a rebound in the growth of the population of rats.

However, the field tests indicate that most households (76%) are not motivated to increase the supply of labour inputs into cocoa cash crop intensification despite potentially higher returns to labour (50% more than current practice), yields (238% more than current practice) and the declining returns to labour offered by other cash crops – principally copra. Partiipants indicate that the main reason that they would not be willing to adopt the method of cocoa CCI examined in the trial, was their commitment to copra production (56%), as well as to inter-household transfers (18%) and food production (16%). Further, participants in the trial indicated that additional increases in the price of cocoa may entice them to adopt cocoa CCI. This suggessts that though cocoa IPDM offers a superior return to effort, it does not – as yet –

offer a sufficient return to labour to entice cash crop labour from the more convenient, 'flexitime' cash crop cocoa; or from food crop production and inter-household transfers. The study team interpreted this result as evidence that smallholders place a significant premium on the flexibility afforded by copra production; and further, that maintaining the household labour time to meet one's social obligations is of significant importance to the household.

The comparative returns to labour offered by food production, off-farm production and inter-household transfers are not known. However the findings of this chapter imply that the social and economic benefits derived by households from their participation in inter-household transfers exceed the marginal economic benefits of additional cocoa production. Therefore, it would not be advisable for households to withdraw labour from non-cash crop production activities in order to supply additional family labour to the adoption of a full suite of cocoa management practices, despite the positive returns to labour identified here. A significant further increase in world cocoa prices, or access to higher priced niche cocoa markets resulting in a significant increase in the farm gate price offered to farmers, may provide the required lift the returns to cocoa labour for Malekula's farmers to decrease family time invested in copra production, or other activities.

Futher research is needed to understand the returns to labour offered by food crop production and off-farm employment, relative to those offered by cash crop (copra and cocoa) production; and therefore be able to develop an accurate household model for predicting future

labour supply responses on Malekula. However, the social and economic benefits most important to motivating inter-household transfers are explored in Chapters 7 and 8.

Further research needs to be undertaken to identify the potential impact of social learning on adoption of cocoa CCI, and whether the power of demonstration – of IPDM methods and of the additional income benefits resulting from it – by the 24% of households who indicated that they would adopt CCI methods, provides a more powerful training and motivational tool than participation in the 12-month trial on a small plot, and the returns to labour calculations provided by the study team to farmers. A subsequent field investigation to identify how many farmers are practicising cocoa IPDM methods, and their reasons to adoption or non-adoption, might be instructive on this matter.

The investigation of other factors impacting upon yield, and the introduction of other technologies which do not require significant additional labour or capital input, might be more successful at cocoa CCI than the IPDM method tested in this study. For example, it wasn't investigated whether the low yields and returns derived from cash crop production could also be a consequence of soil infertility. ACIAR researchers identify soil fertility is a major drag on productivity in smallholder tree-crop systems, given the lack of fallowing or other traditional soil fertility techniques employed in food cropping by these farmers among more permanent tree crops (Nelson et al. 2011). ACIAR is currently developing targeted intervention strategies to strengthen soil fertility management techniques to promote smallholder livelihood improvements among coffee farmers in Papua New Guinea, understanding the socio-economic constraints to

adopting time consuming or capital intensive soil fertility methods (ACIAR 2010). Policy-makers should not ignore alternate opportunities such as these to increase the returns to cash crop labour within the socio-economic conditions prevailing in Malekula, and improve income levels generated by cash-crop intensification livelihood strategies.

The development of supply relationships between Malekula cocoa producers and niche cocoa markets has also begun to increase the incentives for smallholders to intensify cash crop production, by raising the price paid for cocoa for a small group of producers marketing to local chocolate manufacturer and also exporting to artisnal chocolate manufacturers in Australia. Successful marketing of higher quality beans to artisanal chocolate bar manufacturers in Australia has begun to help to improve the farm gate cocoa price for growers on Malekula. In addition, local manufacturing of chocolate products to market to tourists and domestic consumers has begun to provide another higher value market for local growers. Similarly national policy-makers have introduced a National Organic Policy which aims to assist cocoa growers obtain organic certification and potentially higher cocoa prices. Further research is required to explore how producers are responding to these new value chain opportunities, in order to assess whether more farmers are investing additional labour in adopting improved production or processing technologies. In particular, further research is required to identify what household factors are most important for understanding differences in engagement with modern markets, including: capital endowments (level of education, size of landholding, size of family labour supply, etc); proximity to market; access to external inputs like remittances or agricultural

extension training; labour commitment to other cash crops, food crops, off-farm employment or inter-household transfers; or other factors. This research will help to explain household engagement with modern markets, and predicting their response to value chain incentives.

9.3 What social and economic benefits are most important in explaining why households supply labour to inter-household transfers?

Chapter 7 explores which factors are most important to motivate smallholders to supply family labour to inter-household transfers. This chapter tested 11 different possible motivations, covering 3 different categories of social or economic benefit.

Three of the eleven motivating factors included in the choice experiment were related to the importance of labour allocation for social capital formation: to increase the status of the household; to increase one's personal status; and to ensure the household is supported in a dispute. These attributes were included as a result of key informant interviews and the supporting literature indicating that household's social capital and relations are critical to facilitating access to contested resources, where access is determined by non-market institutions. Given the frequency of land disputes in the rural areas of Vanuatu, ensuring support of influential households in a land dispute was also identified as a potentially important factor motivating households to invest in social capital formation.

Four of the eleven motivating factors highlighted specific potential short-term and long-term economic benefits that could be gained by households, including: to ensure that one's

household receives many gifts of food and cash when it comes to their time to host a 'life cycle' ceremony; to ensure the household receives additional labour when required; to ensure the household receives additional land as needed; and to ensure the household receives emergency assistance when required. Ensuring access to additional land when required was included given the importance of this input to increasing household income levels in Vanuatu, and the strong links between size of landholding and household livelihoods in the literature. Similarly, securing access to additional labour inputs was included given that households have been identified to face labour constraints and that under this customary inter-household transfer, select households are provided with supplementary labour through village institutions. Receiving 'contributions for ceremonies' was included as a factor because of the demand that the celebration of 'life cycle' ceremonies places on household budgets and the importance of securing contributions from others in order to meet these expenses; and the motivation to invest household resources to secure future access to emergency assistance was included in the choice set, given the frequency of natural disasters and the frequency at which households that have been shown to seek the support of other households in times of sickness and financial need.

The four remaining factors refer to the motivation to contribute labour resources to maintain the authority of local leaders, and their capacity to mobilize resources for the provision of village public goods – including the maintenance of law and order. One variable was concerned with the motivation to maintain the customary tradition of 'voluntarily' contributing resources to community activities (maintaining traditional village life) while two variables were

concerned with maintaining the integrity of the capacity of specific authorities to command family labour for specific public or private initiatives (respect the authority of elders and chiefs; respect the authority of priests or reverends). The factors were included given the clear findings of past research indicating that the authority of chiefs and priests are highly respected in rural areas and that contributing household resources in order to assist the capacity of local authorities to provide public goods (such as law and order and maintenance local infrastructure) are valued by households. The variable 'respecting the requests of other households' was included given that the maintenance of the tradition to helping others was seen as an important basis for many of the other reciprocal benefits provided through inter-household transfers.

Chapter 7 used a BW scaling experiment and aggregate analysis of data to identify which of these factors was most important. The results of this method indicate that, on average, the factor *to maintain traditional village life* is the most important aggregate motivation (standardized to 100%) for determining household allocation of labour to inter-household transfers. Scaled at 95%, the factor *respect the authority of elders and chiefs* can be considered as a very important motivation for households. *Improving the status of the family* (86%); *to access land in the future* (71%); *respecting the authority of the priest or reverend* (53%) are also important factors motivating households to allocate labour to inter-household transfers. Three factors received similar scores and can be considered as only moderately important to the average household: *to access labour in the future* (49%); *improving my own status* (47%); and *respecting the requests of other families* (43%). Less important were the factors *to receive*

contributions in times of need (38%) and *to receive contributions to ceremonies* (28%). *Ensuring support in a dispute* is the least important motivating factor (achieving approximately 15% relative importance).

These results are that households are strongly motivated to supply resources to inter-household transfers in response to requests made by local authorities, such as chiefs and high status families; though they were less strongly motivated to supply resources when requests were made by other families. Social capital formation and the attainment of high status appear to play an important role in motivating households to supply household resources to inter-household transfers. Accessing land is an important motivation, but accessing labour is less important. That only 49% of households indicated that the receipt of labour is an important motivation to contribute to inter household transfers, indicates that the reciprocation of labour is not an important feature of the inter-household transfer system on Malekula.

The key conclusion from the BW scaling experiement is that chiefs and elders are viewed by households as the agents most capable of providing the most valuable public and private benefits to households, perhaps stemming from their management of the communities' labour, land and other resources. In comparison, priests and other families would seem to possess a lower level of capacity to redistribute community labour and other resources in ways that provide public and private benefits of comparative value. Receiving private contributions of support (for customary ceremonies or in times of need) are not seen as important, nor is receiving support

from other households following a dispute, because these provide less economic benefits to the household.

9.4 Can distinct clusters or sub-populations be identified to distinguish how and why households supply labour to inter-household transfers?

In Chapter 7 LC analysis was used to identify whether there is significant heterogeneity in the motivating factors selected by households in the sample population to investigate how variations in household characteristics and factor endowments relate to the relative importance households' place on different motivating factors. A Tukey test was used to identify whether means differ significantly across clusters. Descriptive analysis is used to identify how household endowment levels differ across the clusters.

This method identified that four distinct clusters of households in the sample set are motivated to supply labour to inter-household transfers by different factors. The largest Cluster (Cluster 2, representing 34% of the household population) is motivated to allocate labour to inter-household transfers to obtain higher social status for their family. They also appeared more concerned with responding to private requests for assistance and providing direct assistance to other households, than to contributing to public good production by directing their labour via traditional authorities (chiefs, priests, etc). Households in this cluster supply considerably fewer person days of family labour to inter-household transfers, cash crop production, food crop production and off-farm income generation, compared to two of the three other Clusters. This is

despite households in Cluster 2 enjoying relatively large landholdings and labour endowments. The relatively high levels of remittance income enjoyed by households in this Cluster may be the most important factor in dampening their rates of supply of labour to both on and off-farm income generation compared to their rate of supply of labour to inter-household transfers.

In contrast, households in the second largest Cluster in the sample population (Cluster 1, comprising 32% of households) was highly motivated to contribute resources to inter-household transfers due to a sense of respect for the requests from traditional authorities as well as other households, in order to increase their household's social status. Cluster 1 households tended to invest a large amount of person days of family labour (112 person days per year, the second most of any Cluster) in transfers to inter-household transfers. Households in Cluster 1 also tended to invest large amounts of person days of family labour in food crop and cash crop activities. The high proportion of land held under freehold title by households in this Cluster may be an important factor in their motivation to supply labour to on-farm activities. Households in this Cluster had the highest levels of off-farm income among the four Clusters, which also seems to indicate that off-farm income generation does not seem to significantly affect their supply of labour on-farm.

Households in Cluster 3 (18% of the sample set) are highly motivated to respond to the requests of priests, other families and chiefs, but seek few economic benefits other than material contributions by other households to support the celebration of life cycle ceremonies. They supplied the least amount of labour of any Cluster to inter-household transfers – just 33 person

days per year - despite having the smallest landholding size and supplying the least amount of family labour to both food and cash crop production of any Cluster. The rate of off-farm income for households in this Cluster is the second highest of all four Clusters. These results indicate that the low-rate of supply of labour to on-farm production activities by households in this Cluster is motivated not by their commitment to village labour activities, but to their commitment to off-farm income. Given their low rate of supply of labour to on-farm activities and inter-household transfers, one would expect to see a corresponding low level of motivation by members of this Cluster to supply labour in order to improve households' access to land.

Households in Cluster 4 (16% of all households) are most committed to supplying labour to inter-household transfers, whilst also investing the most amount of labour in cash crop production. Households in Cluster 4 also supply the second most labour to food crop production though receive the lowest level of farm income and off-farm of the four Clusters. This indicates that households in this Cluster have not withdrawn agricultural labour from cash crop production in order to invest additional labour in inter-household transfers. Rather, these households continue to struggle to generate an income from cash crop production given the high marketing costs resulting from being located the furthest distance from market and and having the lowest rates of access to farm extension advice or rates of membership of farming co-operatives, of the four Clusters. Compared to other clusters, they also have the smallest labour endowment and second smallest land endowment. Perhaps owing to their relative poverty of income and resources, households in this Cluster are highly motivated to invest in social capital formation in

order to secure higher family status to access to village labour and land, and additional income generation potential that this result might bring.

These results suggest that smallholders on Malekula are primarily motivated to supply labour to inter-household transfers in order to secure social status – though the results do no indicate as clear a link between status accumulation and the primary economic benefits associated with it: improved access to land and improved access to labour.

These results also suggest that the supply of labour to inter-household transfers does not have a dampening effect on the supply of labour to on-farm activities, such as cash crop production. Indeed, the results of this chapter indicate that households which have the highest rates of supply of labour to on-farm activities also have the highest rates of supply of labour to inter-household transfers. However these results do indicate that off-farm income generation has a dampening effect on on-farm labour supply. In addition, remittances seem to have a more important dampening effect on the supply of labour to households than demand for household labour from inter-household transfers. The result of the impact of the supply of inter-household transfer labour on the household and their motivation to either supply labour to inter-household transfers or to other productive activities (food crop production, cadh crop production, off-farm income generation) was not explored here.

These results do not clearly indicate, however, what the utility of ‘status’ is; and therefore why households are so keen to invest scarce labour resources to obtain it? Futher research could perhaps reveal whether household contributions to inter-household transfers do more accurately

reflect the payment of ‘traditional land taxation’ required to secure the households current landholdings under tribal tenure, rather than a mechanism to secure more land in the future. Perhaps status accumulation is only a means to this end for the truly few, for a number of reasons: inequality in original endowments of status, owing to family lineage (membership of ‘chiefly’ families) or wealth, giving certain households a big head start in the race to accumulate status and influence which cannot be easily overtaken through participation in inter-household transfers; that status is relative and that there are limited numbers of ‘high’ status ranks in any community and that therefore, the limited numbers indivuals who can influence the important economic decisions of the community (such as the allocation of land) naturally limits the number of individuals who truly can be ‘contenders’ for (and therefore invest in obtaining) high status.

Further research needs to be undertaken to explore how the benfits of payments of labour and goods are attributed to satisfaction of social obligations (i.e payment of traditional land taxation) and investment in social capital accumulation. In addition further research needs to investigate questions such as: What is the going rate of payment to meet social obligation, in order to be able to determine at what rate a surplus is paid? Does the value of ‘traditional land taxation’ change? What factors lead to changes i.e. size of landholding, size of landholding family, status of the family, location of land, or others?

9.5 What household factors are significantly correlated with the receipt of assignments of supplementary labour?

In Chapter 8 this study explored a number of factors identified as potentially important to explaining why some (29.4%) households receive assignments of supplementary labour, and not others, when nearly all of them contribute labour to the inter-household transfer mechanism.

The use of OLS regression analysis revealed that the education level of the household head, size of household landholding, value of remittances, person days of village labour contributed by the household, receipt of agricultural extension advice and membership of a farm co-operative, are all factors significant to the assignment of village labour to a household.

The education level of the household head and size of household landholding are positively correlated with the assignment of village labour to the household. Analysis of the descriptive statistics revealed households assigned village labour possess a much larger area of cropland than households who do not – almost 50% more. The significance of a positive correlation between the assignment of village labour and the size of the household landholding might indicate an efficient allocation of surplus labour by other households, given these households enjoy a lower ratio of family labour to land and therefore, a likely greater volume of unmet market labour demand. This positive correlation could also imply that these households already possess a higher status, if status is interpreted to provide access to additional land – or that a landholding above the mean size indicates the possession of higher status. Though equally, a larger landholding could be the result of an inheritance and if status is not also inherited, then larger sized landholding could equally indicate the past, rather than present, status of the

household. However, receipt of an assignment of labour might indicate that the household enjoys higher status. The positive correlation between the education of the household head and the assignment of labour can be interpreted to indicate that attainment of a higher level of education confers additional status on a household - or households headed by relatively well educated adults are more effective at persuading other households to provide labour.

The amount of labour expected of the household by the village, is significantly correlated with the assignment of village labour to the household. This result can be interpreted to indicate that a greater volume of labour is available to be assigned to households - once the production of public goods (maintenance, sanitation, etc) has been completed – in villages where more labour is contributed to the inter-household transfer system.

The strong positive correlation between household membership of a farm co-operative, and the receipt of village labour, perhaps indicates that membership of a co-operative is a result of - or means to - higher status. Similarly, this strong positive correlation might also indicate that members of co-operatives are more active in exchanging labour to assist their members to address deficits in household labour supply needs at times of peak demand, and that the inter-household transfer system shares some features of a labour exchange. Finally, members of farmer co-operatives might also be more effective at signalling their need for supplemental labour, given they are likely to commit a greater volume of labour inputs to cash crop production.

The strong negative correlation between access to farm extension advice in the last 12 months and the assignment of village labour is more difficult to interpret. Perhaps households receiving extension advice are less in need of assignments of labour from the village, or are seen as less in need, and are therefore assigned less supplementary labour; or perhaps they are likely to be located in villages which are more dedicated to cash cropping, and therefore have less surplus labour to contribute to inter-household transfers.

These results show that larger endowments of capital - social (membership of farm co-op network), human (education) and physical (land) are important to the assignment of labour to a household. A number of conclusions can be drawn from this: larger capital endowments are status symbols; they are also a means to, and result of, higher status; and therefore the assignment of exogenous inputs of labour to households it correlated with their relative status level.

This study acknowledges the limitations of the OLS regression model for explaining causation, and therefore identifying which household factors are effectively driving the assignation of inter-household labour transfers. This study also acknowledges the limitations of a simple one time survey ‘snapshot’ of the inter-household transfer mechanism. All households may receive inputs of labour over a long-enough period of time. This model might indicate that households assigned labour are better endowed with capital, but a (longitudinal) panel series of data on inter-household transfers might indicate that labour assignment is correlated with other factors. However, the difficulty of collecting accurate panel series data is considerable. One

option for further research is, rather than to aggregate all households receiving an assignation of labour into one common group, to investigate how endowments may change as the volume of assigned labour increases or decreases. Certainly, further research is required before a definitive conclusion to this question can be offered.

9.6 What is the impact of the assignment of supplementary labour on household labour supply responses to both on and off-farm income generating activities?

Chapter 8 investigates whether assignments of village labour assist smallholder households to release family labour from subsistence production, in favour of on and off-farm activities offering higher returns to effort. This study used Heckman's (1976) two-stage estimator with an Inverse Mill Ratio (IMR) to develop a robust measure of the change in the total number of person days of labour supplied by 497 smallholder households in the sample, to: cash crop production, food crop production, off-farm employment and the provision of labour to inter-household transfers, as well as the hiring of market labour.

The study identifies two central findings: 1) that the impact of the assignment of village labour on the supply of household labour to cash crop farming activities is significantly negative; and 2) the impact of the assignment of village labour on off-farm employment activities is significantly positive. Indeed, the assignment of village labour to households decreases their supply of labour to cash crop production, whilst increasing their supply of labour to off-farm activities and increasing the amount of market labour hired by the household.

These two significant results indicate that the assignment of village labour assists select households to effectively release family labour from farm duties in order to redirect labour to off-farm activities, rather than supplement family labour in cash crop production - thus enabling households to obtain higher returns to labour. That households receiving supplementary agricultural labour are not motivated to increase the supply of their family labour to agricultural activities – either food crop production or cash crop production – but instead shift family labour towards off-farm employment, indicates that off-farm employment offers higher returns to labour than on-farm activities.

This result also indicates that village labour assignments do not assist households to overcome deficits during times of peak demand but assist privileged households to substitute family on-farm labour with village labour.

While this study provides an indication that off-farm income generation offers the highest returns to labour (relative to cash crop production, food crop production and inter-household transfers) it does not enable an accurate estimation of the returns to labour provided by off-farm employment so that these can be compared to those of cocoa and copra production; nor does not enable an accurate estimation of the returns to labour provided by inter-household transfers or food crop production. This limits the level of certainty which can be attributed to the conclusion that off-farm income generation provides a superior return to labour than the other activities. Other factors, not explored in this model, may be contributing to the preference for this activity. This could include the status conferred by off-farm relative to on-farm work, or the fringe

benefits of engaging in off-farm employment, e.g. regular access to a vehicle for drivers, or regular access to cheaper urban markets for urban workers, or being more regularly absent from the demands placed on their labour time and/or income by village activities, etc. There are many, many more possible benefits not able to be explored here, which could be tested through more detailed qualitative and quantitative investigations.

Improvements to the development of a household model could be made to more accurately predict household labour responses to the assignment of an exogenous input of labour. This two-step model investigates correlations between the assignment and supply of receipt of household labour during the same 12 month time period – but isn't able to investigate causality. Implementing a subsequent survey of the labour supply responses of the same group of sample households would be able to more accurately describe the impact of inter-household transfers.

Similarly, the use of some game theory experiments to explore how households at different status levels or capital endowments assign and respond to labour or cash transfers, could provide an insight into the function of inter-household transfers in the accumulation of status and the function of status in attracting inter-household transfers.

Finally, in order to improve the predictive power of household models for accurately estimating smallholder labour supply responses in SIDS, further research is required to increase our empirical understanding of intra-household labour relations, particularly the impact of gender and cultural norms on reducing supply of labour to cash crop production and potentially, to other forms of activity such as home work, food crop production and off-farm income generation.

9.7 Are CCI strategies an effective mechanism for assisting rural smallholders to improve their livelihoods?

This study indicates that cocoa CCI strategies do not offer the most effective strategy for assisting rural households to improve livelihoods. However, they are not completely ineffective. Assuming the cost of the intervention remains the same, assisting more households into off-farm employment would be more efficient at raising rural household incomes, which would contribute to improved livelihood outcomes. However, higher world cocoa prices, farm gate prices (achieved through improved access to niche markets) or lower copra prices would improve the relative returns to labour provided by cocoa CCI and increases the efficiency of this strategy, relative to off-farm employment. This has important implications for CCI and interventions aiming at facilitating improved rural household income levels in Vanuatu. The evidence presented here indicates that rural development interventions in SIDS should not prioritize CCI strategies for smallholders - all things remaining equal - given the lower returns to labour offered by intensive cocoa production relative to off-farm employment, and other economic activities.

9.8 What are the main implications of these findings for policy

Future rural development interventions should prioritize programs that facilitate increased participation in off-farm labour markets by rural households. However, entry into off-farm income generating activities often requires that households possess higher level

endowments - such as educational attainment, or proximity to potential employers - which eliminate many remote, rural smallholder households with poor access to education.

In addition, faced with a rapidly expanding youth population and rising demand for income, opportunities for off-farm employment are limited - despite growth in employment opportunities associated with tourism. Therefore the rural economy has a key role to play in offering income generating opportunities to young ni-Vanuatu. Increasing the capacity of young farmers to generate a livelihood from customary land resources will be critical to future prosperity of Vanuatu. Reducing the value of smallholder labour and therefore potential income lost to the household as a result of being diverted to status generating activities required, in part, to help maintain the household claim to customary land and improve access for future descendants, will be central to this process. However this needs to be achieved in a manner which does not result in a loss of household access to public goods - such as maintenance of local infrastructure and law and order – traditionally provided through the authority of chiefs and 'big men.' This is particularly important given the relative limited financial capacity of the national government to replace the delivery of these important public services in remote rural areas. Therefore a major policy challenge facing Vanuatu is creating a balance between the high levels of labour time expected to be committed to community activities by traditional elders, and satisfying the rising demand for income among smallholder households, as a result of increased expenditure on consumer goods and education.

Measures to increase the security of land tenure and access to additional land would help to reduce the transaction costs associated with accessing inputs and securing the tenure of current landholdings by reducing demand for labour from inter-household transfers. Currently there is no provision for registration of customary land – only formal leases may be registered. Establishing a national land registry listing individual household claims to customary land and establishing a medium to long-term leasehold on the basis of that claim, would help to reduce both the need to divert labour resources to inter-household transfers. This would also improve securitzation of bank loans and therefore increase smallholder access to capital, encouraging investment in developing customary land resources for cash crop production.

In addition increasing the security of land tenure for women might help increase the supply of female labour to cash crop production. Ensuring that women's rights to use customary land are registered in the land registry will help to incentivise women's investment of labour in cash crop production. Similarly, efforts to encourage chiefs to support women's participation in the adjudication of land disputes and on land dispute tribunals would also help improve the security of women's investment in cash crop production. Establishing rural land banks of unused or reserve land and prioritizing them for agricultural development may assist households wanting to invest more household resources in cash crop production to access land, without having to divert resources to inter-household transfers.

Similarly improving the capacity of the national or municipal governments to deliver the public goods - such as maintenance of village infrastructure and improved policing now being

provided by local chiefs through the inter-household transfer mechanism – would reduce demand for household labour contributions to this mechanism.

The indication that farm co-operative members are less committed to cash crop production than non-members indicates that authorities aiming to facilitate CCI should not invest in the development of farm co-operatives, at least not of the type currently in operation on Malekula.

9.9 Contribution of the study

This study contributes to the emerging body of literature on the factors influencing smallholder labour supply responses in rural and remote communities, such as in SIDS. It identifies a unique, new factor influencing smallholder labour supply responses: the village labour market. In addition, it describes the utility offered to smallholders by inter-household transfers, and their impact on household labour supply responses, specifically in relation to CCI. To achieve these aims, this study developed a culturally sensitive survey instrument informed by reviews of the anthropology and agricultural economics literature, semi-structured interview with lead farmers from Malekula, and pre-testing among 480 households from two (out of 6) of the island's Area Councils.

This study contributes to the literature in several important ways. First, it identifies that demand for household labour from village authorities does have an impact on smallholder labour supply decisions. This study assesses the motivation to supply labour to the village by using a

unique methodology for identifying the most important motivating factors: BW scaling. BW scaling has previously been used to understand farmer marketing decisions. This is the first known example of using this methodology to measure factors influencing farmer households' labour supply decisions.

Second, it uses a two-stage robust estimator to identify that assignments of village labour effectively release household labour from farming activities in order to pursue higher returns off-farm. Therefore, the village labour market provides higher status households with family labour substitutes, not supplementary labour in order to enable them to overcome labour supply deficits at times of peak demand.

Subsequently, this study provides empirical evidence that national authorities and development practitioners designing rural programme and policy interventions designed to improve household incomes should carefully consider the cultural context and the demands placed on the available household labour supply by local elites, before implementing agricultural programmes which demand additional labour inputs from households. They should also carefully consider the comparative returns to labour offered by competing activities, including from inter-household transfers. Indeed, this study illustrates the potential utility benefits offered by a long-run investment in social capital generation enable select households to access supplementary inputs of land and labour sufficient to raise incomes and release them from semi-subsistence activity to pursue higher-wage employment outside of the farm sector.

Finally, this study identifies a number of specific policy interventions which would help to improve the availability of smallholder labour for CCI and other income generating opportunities, without significantly eroding the cultural traditions and redistributive authority of local chiefs in rural and remote SIDS communities.

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Appendices

Appendix 1 - Questionnaire

Cocoa Livelihoods Survey - Vanuatu 2012

THE UNIVERSITY OF ADELAIDE AUSTRALIA

Australian Government
Australian Centre for International Agricultural Research

Name of head of family	
Name of respondent	
Village	
Area Council	
Enumeration Area	
Enumerator's Name	
Enumerator's Code	
Interview Number	

Introduction: This survey will investigate farmer livelihoods on the Island of Malekula, with a particular focus on cocoa.
The purpose is to identify methods to improve household income from cash crops
The data collected as part of this survey are for research purposes ONLY.
Household-level data will not be shared with non-research organizations.
Only summary results will be included in published report.

	Date		
	Day	Month	Year
Interview			

Time : from .. to …

Enumerator signature

Section A. Characteristics of members of the household

Is the respondent the head of the household? [ ] A1

0. No; 1. Yes

Household member number	What is the relationship between [household member number] and the head of household?	Is [household member number] a male or female?	How old is [household member number]? [age at last birthday, use 0 for < 1 yr]	What is the marital status of [household member number]?	How many years of schooling has [household member number] completed?	How many months of the year did [household member number] live with the household out of the last 12?	What is the main activity of [household member number]? **Ask question only for hh members aged 14 years and older**	What is the second most important activity of [household member number]? **Ask question only for hh members aged 14 years and older**
	Use code	Use code		Use code			Use code	Use code
	1 Head	1 Male	Years	1 Single	Years	Months	1 Food production	1 Food production
	2 Spouse	2 Female	(1-100)	2 Married	(1-12)	(1-12)	2 Livestock	2 Livestock
	3 Son/daughter			(3 Separated)			3 Fishing	3 Fishing
	4 Son/daughter in law			(4 Divorced)			4 Cash Crop production	4 Cash Crop production
	5 Grandchild			(5 Widowed)			5 Look after shop or co-op	5 Look after shop or co-op
	6 Parent or parent in law			6.Other			6 Run own business	6 Run own business
	7 Other related						7 Paid employee	7 Paid employee
	8 Other unrelated						8 Student	8 Student
							9 Unpaid housework	9 Unpaid housework
							10 Retired	10 Retired
							11 Looking for work	11 Looking for work
							12 Looking after village affairs	12 Looking after village affairs
	A2	A3	A4	A5	A6	A7	A8	A9
1								
2								
3								
4								
5								
6								
7								
8								
9								
10								

Note: The household (hh) is defined as a group of people who live and eat together most of the time.

The head of hh is defined as the hh member who makes most of the economic decisions.

B. CASH INCOME ACTIVITIES

Which activities do you regard as your household's 1st, 2nd and 3rd most important source of cash income? (Put 1, 2 and 3 in relevant box, and 0 in other boxes)		
copra		B1.1
cocoa		B1.2
kava		B1.3
vegetables from food garden		B1.4
livestock (cows)		B1.5
smallstock (chickens, pigs, goats)		B1.6
waged employment		B1.7
own business		B1.8
Remittances (cash) from relatives in town		B1.9
Gifts of food or other items		B1.10
Other		B1.11

Note: for each of the items below, ask B2; if B2=1, ask B3 and B4 before moving to next item (e.g B2.1 have you received income from the sale of cocoa? B3.1 If Yes, how many months a year did you receive income from the sale of cocoa? B4.1 In the last month, how much income did you make from the sale of cocoa? B5.1: has cocoa become more or less important as share of your income, or stayed the same?) If B2=0, enter a 0 in boxes in B3, B4 and B5 for that item (e.g .2)

Income activity		In the past **12 months**, has your household received income from [activity]?	[---------- if B2 = yes ----------] IF YES: In the past **12 months**, how much income did your household receive from [activity]?	[---------- if B2 = yes ----------] Over the past 5 years, has [activity] become **more** or **less** important as a share of your income, or stayed the same?
		Code 0. No; 1. Yes	Vatu Put number of Vatu in relevant box where B2=1, and 0 in the other boxes	Code Place a 1,2 or 3 in relevant box (if B2=1) and 0 in all other boxes 1. More important; 2. Less important; 3. Stayed the same
		B2	B4	B5
Sale of Cocoa	.1			
Sale of Copra	.2			
Sale of kava	.3			
Sale of vegetables from food garden	.4			
Sale of livestock (cows)	.5			
Sale of smallstock (chickens, pigs, go	.6			
Waged employment	.7			
Own business	.8			
Remittances from relatives	.9			
Gifts of food or other items	.10			
Other _____ (spec	.11			

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C. HOUSEHOLD EXPENSE ITEMS				
How have your household expenses changed in the past 5 years?			C1	
1. Gone up;		Number		
2. Gone down;				
3. No change				
Which types of expenses do you regard as your households **most** important source of expenditure?				
Please identify your first, second and third most important by entering a 1, 2 or 3 only in those boxes				
School fees and other costs of sending your children top school			C2.1	
Buying food from the store			C2.2	
Buying houshold items from the store (e.g. soap, kerosene, razor)			C2.3	
Fuel for generator			C2.4	
Clothing			C2.5	
Kava			C2.6	
cigarettes and alcohol			C2.7	
Transport costs			C2.8	
Medicine and doctors fees			C2.9	
Credit for mobile phone			C2.10	
Gifts and payments for weddings, funerals, circumcision and other ceremonies			C2.11	
Contributions to village projects and activities			C2.12	
Payments for Church			C2.13	
Other (please specify)			C2.14	
Which types of expenses do you regard as your households **least** important source of expenditure?				
Please identify your least, second least and third least important by entering a 1, 2 or 3 only in those boxes				
School fees and other costs of sending your children top school			C3.a	
Buying food from the store			C3.2	
Buying houshold items from the store (e.g. soap, kerosene, razor)			C3.3	
Fuel for generator			C3.4	
Clothing			C3.5	
Kava			C3.6	
cigarettes and alcohol			C3.7	
Transport costs			C3.8	
Medicine and doctors fees			C3.9	
Credit for mobile phone			C3.10	
Gifts and payments for weddings, funerals, circumcision and other ceremonies			C3.11	
Contributions to village projects and activities			C3.12	
Payments for Church			C3.13	
Other (please specify)			C3.14	

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Note: for each of the items below, ask C3; if C3=yes (1), ask C4 and C5 before moving to next item (e.g If the answer to C3.1 'have you paid school fees in the past 12 months', is Yes, then move on to C4.1: 'In the past 12 months, how much have you spent on school fees?', enter the amount in Vatu then move on to C5.1: Over the past 5 years have school fees become more or less important as share of your households expenditure, or stayed the same?) If C3=0, enter a 0 in boxes in C4 and C5 for that item then move on to next item, C3.2)				
		In the past 12 months, has your household had to pay for or contribute to [item]?	[----------If C3 is Yes ----------]	
			In the past 12 months, how much has your household had to pay for [item]?	Over the past 5 years, has [item] become **more** or **less** important as a share of your expenditure, or stayed the same?
		Code	**Vatu**	**Code**
		0. No;		1. More important
		1. Yes		2. Less important
				3. The same
Items		C8	C9	C10
School fees	.1			
School books, uniforms, and other associated education costs	.2			
Buying food from the store	.3			
Buying houshold items from the store (e.g. soap, kerosene, razor)	.4			
Fuel for generator	.5			
Clothing	.6			
Kava, cigarettes and alcohol	.7			
Transport costs	.8			
Medicine and doctors fees	.9			
Credit for mobile phone	.10			
Other household costs	.11			

Note: for each of the items below, ask C6; if C6=1, ask C7 and C8 before moving to next item (e.g C6.1: 'In the past 12 months have you made any payments to your Church?', answer is Yes, move to C7.1: In the past 12 months how much have you spent on payments to your Church; and C8.1: have payments to your Church become more or less important as a share of your household's expenditure, or stayed the same?) If C6=0, enter a 0 in boxes in C7 and C8 for that item then move on to next item (C6.2)

		In the past 12 months, has your household had to pay for or contribute to [item]?	[----------If C6 is Yes ----------]	
			In the past 12 months, how much has your household had to pay for or contribute to [item]?	Over the past 5 years, has [item] become **more** or **less** important as a share of your expenditure, or stayed the same?
		Code	**Vatu**	**Code**
		0. No;		1. More important
		1. Yes		2. Less important
				3. The same
Items		C6	C7	C1a
Payments to your Church	.1			
Contributions to village projects and activities	.2			
Cash payment for wedding of someone in your household	.3			
Contribution of gifts of food, handicrafts or kava towards the wedding of someone in your household	.4			
Cash payment for wedding for someone outside of your household	.5			
Contribution of gifts of food, handicrafts or kava towards the wedding of someone outside your household	.6			
Cash payment for funeral for someone in your household	.7			
Contribution of gifts of food, handicrafts or kava towards the funeral of someone in your household	.8			
Cash payment for funeral for someone outside of your household	.9			
Contribution of gifts of food, handicrafts or kava towards the funeral of someone outside your household	.10			
Cash payment for circumcision ceremony of someone in your household	.11			
Contribution of gifts of food, handicrafts or kava towards the circumcision ceremony of someone in your household	.12			
Cash payment for circumcision of someone outside your household	.13			
Contribution of gifts of food, handicrafts or kava towards the circumcision ceremony of someone outside your household	.14			
Contribution of gifts of food, livestock, smallstock, handicrafts or kava in return for using land	.15			
Contribution of gifts of food and kava in return for men and women outside your household helping you with agricultural activities	.16			
Other contributions of gifts of food, livestock, smallstock, handicrafts or kava to people outside your household	.17			

Does any member of your household own…		Now		how many		5 years ago		how many	
a generator?	0 No 1 Yes		D1		D1a		D1b		D1c
a mobile phone?	0 No 1 Yes		D2		D2a		D2b		D2c
a motorbike?	0 No 1 Yes		D3		D3a		D3b		D3c
a car or truck?	0 No 1 Yes		D4		D4a		D4b		D4c
a horse	0 No 1 Yes		D5		D5a		D5b		D5c
a chainsaw?	0 No 1 Yes		D6		D6a		D6b		D6c
a pruning saw	0 No 1 Yes		D7		D7a		D7b		D7c
a wheelbarrow	0 No 1 Yes		D8		D8a		D8b		D8c
a cocoa fermentation box(es)	0 No 1 Yes		D9		D9a		D9b		D9c
a cocoa hot air drier	0 No 1 Yes		D10		D10a		D10b		D10c
a cocoa solar drier	0 No 1 Yes		D11		D11a		D11b		D11c

How many hours per week would **you** estimate **you alone** spend engaged in:			How many hours per week would **your entire household** spends engaged in:		
Working in your households food garden?		D12	Working in your households food garden?		D15
Working in your household cash crop plots?		D13	Working in your household cash crop plots?		D16
Engage in village, church and kastom activities?		D14	Engage in village, church and kastom activities?		D17

Section E. Crop Production

	Now		5 years ago	
How many food gardens does your household look after?		E1		E1a
How many cash crop plots does your household look after?		E2		E2a

Do you have **more land, less land or the same** amount of land **now** than you did **5 years ago**? E3

1 More
2 Less
3 The same

If you have more land now(E3=1) How did your household get more land? E4

1 Inherited from a relative
2 Bought land from someone with cash
3 Bought land from someone with gifts (pigs, kava, food)
4 Bought land from someone with gifts (pigs kava, food) and cash
5 Cleared unused village land
6 Managing an absent relatives land temporarily
7 Got land from a dispute
8 Other _____(specify)

If you have less land now (E3=2): How did your household get less land? E4a

1 Lent to a relative to use
2 Sold land to someone for cash
3 Sold land to someone in return for gifts (pigs, kava, food)
4 Sold land to someone in return for gifts (pigs kava, food) and cash
5 Lost land in a dispute
6 Other_____(specify)

1	cocoa
2	copra
3	kava
4	yam
5	bean
6	pumpkin
7	Island cabbage
8	Kumala
9	Vanilla
10	Nangai
11	Pepper

In E5, list and number the total number of plots andfood gardens managed by household, i.e. 1 food plot and 2 cash crop plots = 3 plots. Where more than one crop is grown on the same plot, e.g. cocoa and copra both grown on cash crop plot 2; or yams, island cabbage and taro all grown on the same food plot 1, simply re-use that plot number for each of the different crops and list each different crop in E9, using the crop codes in the table above.

Plot Number	What type of crop are you growing on this plot?	How long is it from your house to this plot?	What is the land tenure for this plot?	What is the total number of trees/plants/stems you have in each plot at the moment?	How much did you harvest from this plot in the last 12 months		Did you sell any of this crop?	**If E14=Yes (1),** How much quantity was sold? If E14= No (0), enter 0		If E9=1, (cocoa) did you sell the cocoa as wet bean or dry bean? If E9 isn't 1 (other crops, skip to next question)	If E16=2 (dry bean) did you use just sun drying, sun drying plus hot air drying, or just hot air drying	If E14=Yes (1) What was the total value of this sale?	If E14=Yes (1) Where did the sale take place? If E14= No (0), enter 0	If E14=Yes (1) and the place of the sale was not on farm (E18=2,3,4, or 5) how was the crop marketed? If E14= No (0), enter 0	If E14=Yes (1) and the place of sale was not on the farm (E18=2,3,4,5) how much did it cost to market the crop? If E14=No (0),
	Choose one code from crop listed in table above	Estimate distance metres	1. Communal 2. Freedhold 3. Private tribal land 4. Other	Quantity Number (1-1000)	Quantity Number (1-10	Quantity unit 1 kg 2 Bags 3 bundles 4 Rolls	No. 0; Yes. 1	Quantity	Quantity unit 1 kg 2 Bags 3 bundles 4 Rolls 5 Buckets	Quantity type 1 Wet bean 2 Dry bean	Drying technology 1 Sun dry 2 Sun dru plus hot air 3 Hot air	Vatu	1. On farm 2. Roadside 3. Wharf 4. Beach 5. Village market 6. Provincial mark	1. On foot 2. Bicycle 3. Motorbike 4. Car 5. Boat 6. Other	Vatu
E5	E6	E7	E8	E9	E10a	E10b	E11	E12a	E12b	E13	E14	E15	E16	E17	E18

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Section F. Cocoa farming labour inputs

In this section, please indicate the **total** labour inputs used by the household for cocoa over the last 12 months.

Please indicate the main activity for each month, as well as what payment method was used, and the amount

Crop 1. Cocoa

Did your household produce cocoa in the last 12 months? **No. 0; Yes. 1** F1

If F1= No (0), please enter a '0' in all the spaces below and skip to the next page. If F1= Yes (1), please ask the following:

How many days of labour did your household spend on this crop each month for the last 12 months. Please add up and enter the number of days of household labour used for each activity for each month (e.g. **Harvesting cocoa in April, 4 days for man, 4 days for wife and 2 days for children = 10) IF NO ACTIVITY FOR THAT CROP THAT MONTH, ENTER A 0 IN THE SPACE**

	January	February	March	April	May	June	July	August	September	October	November	December
Person days												
	F2	F3	F4	F5	F6	F7	F8	F9	F10	F11	F12	F13

If household labour was used, what was the main activity for the household labour used that month. **Please enter an activity code from the list to the right hand side**

Main activity type												
	F14	F15	F16	F17	F18	F19	F20	F21	F22	F23	F24	F25

Was any cash payment made to members of the household in return for completing that activity that month? **No. 0; Yes. 1**

	F26	F27	F28	F29	F30	F31	F32	F33	F34	F35	F36	F37

Was any help from outside of your household used to produce this crop over the last 12 months? **No. 0; Yes. 1** F38

If F38 = No (0), please enter a '0' in all the spaces below and skip to the next crop. If F38= Yes (1), please ask the following:

How many days of labour from outside your household did your household access for this crop for each month for the last 12 months. Please add the total number of people used and for how many days to find total person days used (e.g. **harvesting cocoa in April, 4 days for 4 men = 16) IF NO ACTIVITY FOR THAT CROP THAT MONTH, ENTER A 0 IN THE SPACE**

Person days												
	F39	F40	F41	F42	F43	F44	F45	F46	F47	F48	F49	F50

If outside labour was used, what was the main activity for the household labour used that month. **Please enter an activity code from the list to the right hand side. IF NO ACTIVITY FOR THAT CROP THAT MONTH, ENTER A 0 IN THE SPACE**

Main activity type												
	F51	F52	F53	F54	F55	F56	F57	F58	F59	F60	F61	F62

What was the main source of that outside labour for that month? **Please enter a source of labour code from the list on the right hand side. IF NO ACTIVITY FOR THAT CROP THAT MONTH, ENTER A 0 IN THE SPACE**

Source												
	F63	F64	F65	F66	F67	F68	F69	F70	F71	F72	F73	F74

What was the main method of payment for that outside labour for that month? **Please enter a code from the list on the right hand side. IF NO ACTIVITY FOR THAT CROP THAT MONTH, ENTER A 0 IN THE SPACE**

Method of payment												
	F75	F76	F77	F78	F79	F80	F81	F82	F83	F84	F85	F86

What was the daily rate of payment for that outside labour for that month? **Please enter an amount in Vatu.**

If payment in food and kava, please estimate the cost per man of food and kava (e.g. 200 Vatu food, 100 Vatu kava = 300 vatu). If method of payment is 1. no payment; agree to work for them in the future, please enter a 1

Daily rate (If method cash/vatu)												
	F87	F88	F89	F90	F91	F92	F93	F94	F95	F96	F97	F98

Activity Type Code

1	Land preparation
2	Apply Fertilizer
3	Planting
4	Pruning
5	Weeding
6	Apply pesticide
7	Harvesting
8	Procesing
9	Selling
10	Other

Source of Labour Code

1	Relative/extended family
2	Group of men from village
3	Hired labour
4	Youth group/Church group
5	Other

Method of Payment Code

1	No payment.Agree to help them in the future
2	Provide food and kava at days end
3	Cash/Vatu
4	Other

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Section G. Food garden farming labour inputs

In this section, please indicate the **total** labour inputs used by the household for food garden production activites over the last 12 months.

Please indicate the main activity for each month, as well as what payment method was used, and the amount

Crop 3. Food Garden

Did your household produce any food in the last 12 months? **No. 0; Yes. 1** [ ] G1

If F1= No (0), please enter a '0' in all the spaces below and skip to the next page. If F1= Yes (1), please ask the following:

How many days of labour did your household spend on this crop each month for the last 12 months. Please add up and enter the number of days of household labour used for each activity for each **month (e.g. Harvesting cocoa in April, 4 days for man, 4 days for wife and 2 days for children = 10) IF NO ACTIVITY FOR THAT CROP THAT MONTH, ENTER A 0 IN THE SPACE**

	January	February	March	April	May	June	July	August	Septemb er	October	Novemb er	Decemb er
Person days												
	G2	G3	G4	G5	G6	G7	G8	G9	G10	G11	G12	G13

If household labour was used, what was the main activity for the household labour used that month. **Please enter an activity code from the list to the right hand side**

Main activity type												
	G14	G15	G16	G17	G18	G19	G20	G21	G22	G23	G24	G25

Was any cash payment made to members of the household in return for completing that activity that month? **No. 0; Yes. 1**

	G26	G27	G28	G29	G30	G31	G32	G33	G34	G35	G36	G37

Was any help from outside of your household used to produce **No. 0; Yes. 1** [ ] G38

If F38 = No (0), please enter a '0' in all the spaces below and skip to the next crop. If F38= Yes (1), please ask the following:

How many days of labour from outside your household did your household access for food gardening for each month for the last 12 months. Please add the total number of people used and for how many days **to find total person days used (e.g. harvesting cocoa in April, 4 days for 4 men = 16) IF NO ACTIVITY FOR THAT CROP THAT MONTH, ENTER A 0 IN THE SPACE**

Person days												
	G39	G40	G41	G42	G43	G44	G45	G46	G47	G48	G49	G50

If outside labour was used, what was the main activity for the household labour used that month. **Please enter an activity code from the list to the right hand side.**
IF NO ACTIVITY FOR THAT CROP THAT MONTH, ENTER A 0 IN THE SPACE

Main activity type												
	G51	G52	G53	G54	G55	G56	G57	G58	G59	G60	G61	G62

What was the main source of that outside labour for that month? **Please enter a source of labour code from the list on the right hand side.**
IF NO ACTIVITY FOR THAT CROP THAT MONTH, ENTER A 0 IN THE SPACE

Source												
	G63	G64	G65	G66	G67	G68	G69	G70	G71	G72	G73	G74

What was the main method of payment for that outside labour for that month? **Please enter a code from the list on the right hand side. IF NO ACTIVITY FOR THAT CROP THAT MONTH, ENTER A 0 IN THE SPACE**

Method of payment												
	G75	G76	G77	G78	G79	G80	G81	G82	G83	G84	G85	G86

What was the daily rate of payment for that outside labour for that month? **Please enter an amount in Vatu. If payment in food and kava, please estimate the cost per man of food and kava (e.g. 200 Vatu food, 100 Vatu kava = 300 vatu). If method of payment is 1. no payment; agree to work for them in the future, please enter a 1**

Daily rate												
	G87	G88	G89	G90	G91	G92	G93	G94	G95	G96	G97	G98

Activity Type Code	
1	Land preparation
2	Apply Fertilizer
3	Planting
4	Pruning
5	Weeding
6	Apply pesticide
7	Harvesting
8	Procesing
9	Selling
10	Other

Source of Labour Code	
1	Relative/extended family
2	Group of men from village
3	Hired labour
4	Youth group/Church group
5	Other

Method of Payment Code	
1	No payment.Agree to help them in the future
2	Provide food and kava at days end
3	Cash/Vatu
4	Other

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Section H. Knowledge Practices and Attitudes

For enumerator: Did household sell any cocoa in the last 12 months? [ ] H1
If no (H1=0), skip to section I; if yes (H1=1), continue No. 0; Yes. 1

What do you think is the best way to ferment your cocoa beans?
1. Boxes 3. lap lap leaves 5. Other _____ [ ] H2
2. Bags 4. Don't know

How do you usually ferment your cocoa? [ ] H3
1. Boxes 3. lap lap leaves
2. Bags 4. Don't know

What do you think is the best number of days to ferment cocoa? [ ] H4
Number of days

How many days do you usually ferment your cocoa? [ ] H5
Number of days

How far is it (in minutes, walking) from your house to the closest cocoa fermentary? [ ] H6
Minutes

What do you think is the best way to dry cocoa?
1. Sun dry 3. Sun dry then hot air dry [ ] H7
2. Hot air arier 4. Other _____
5. Don't know

How do you usually dry your cocoa? [ ] H8
1. Sun dry 3. Sun dry then hot air dry
2. Hot air arier 4. Other _____
5. Don't know

How far is it (time, walking) from your house to the closest hot bed for drying cocoa? [ ] H9
Minutes

In the last 5 years have you planted any new cocoa? [ ] H10
No. 0; Yes. 1

If I8=Yes (1) How do you usually replant cocoa? [ ] H11
1. Graft from one cocoa tree to old cocc 5. Seedlings from co-operative
2. Plant seeds from own cocoa pods 6. Seedlings from cocoa buyer
3. Seedlings from own cocoa plot 7. Other _____
4. Seedlings from government

Do you have any black pods appearing in your cocoa trees? [ ] H12
0. No; 1. Yes; 2. Don't know

Are there more black pods in your trees than there were 5 years ago? [ ] H13
0. No; 1. Yes; 2. Don't know

How concerned are you about black pod affecting your cocoa? [ ] H14
1. Not concerned 3. Very concerned
2. Concerned. 4. Don't know

Do you know how black pod is spread? [ ] H15
1. Rain/water 5. not enough light/too much shade
2. From the soil 6. Other
3. Rat 7. Don't know
4. Insects

What do you think is the best way to reduce the number of black pods? [ ] H16
1. Pruning 4. Cleaning/weeding around trees
2. Spraying chemicals 5. Other
3. Removing black pods from trees

What do you do to reduce the number of black pods? [ ] H17
1. Pruning 4. Cleaning/weeding around trees
2. Spraying chemicals 5. Other
3. Removing black pods from trees 6. None

(IF H=17 is not 1: pruning) Please select the first and second most important reason you are not pruning your cocoa trees?
1. Pruning takes too much time; not enough time 1st [ ] H18a
2. I'm scared that pruning my trees will reduce the production of those trees 2nd [ ] H18b
3. I don't know how to prune properly
4. Other

Is your cocoa affected by rats? [ ] H19
0. No; 1. Yes; 2. Don't know

Is your cocoa more affected by rats than it was 5 years ago? [ ] H20
0. No; 1. Yes; 2. Don't know

How concerned are you about rats affecting your cocoa?
1. Not concerned 3. Very concerned [ ] H21
2. Concerned

Do you do anything to try and control rat damage to your cocoa? [ ] H22
0. No; 1. Yes; 2. Don't know

(If H22=1) What do you do to reduce the impact of rats? [ ] H23
1.Place rat poison in cocoa plot
2. Introduce cats and snakes to eat them
3. Provide alternate food for them , such as half coconut in trees
4. Cleaning/weeding around trees
5. Regularlyharvest pods bwefore rats eat them
6. Try and destroy rat breeding sites in cocoa plot
7. other _____

In the last 12 months, how many visits from a Government extension officer have you had? [ ] H24

Where do you usually get you information on proper cocoa management practices
1. Cocoa buyers 5. Non-Government Organisations [ ] H25
2. Government officers 6. Church group
3. Friends and relatives 7. Other
4. Farmers group or co-operative 8. None

Are you a member of a cocoa farmers group or farmers co-operative? [ ] H26
0. No; 1. Yes

(If H26=1) What group or co-operative? [ ] H27
1. Cocoa Growers Alliance (CGA)
2. Vanuatu Organic Cocoa Growers Alliance (VOCGA)
3. Farm Support Association (FSA)
4. Other farmers group or co-operative _____

(If H27=1) Does your group or co-operative provide training on cocoa management?
No. 0; Yes. 1 [ ] H28

Have any members of your household [ ] H29
received any training on cocoa managemen?
0. No; 1. Yes

If H29=1, What did they receive training for? [ ] H30
1. Pruning 5. Grafting
2. Fermentation 6. Rat control
3. Drying 7. Other black pod control
4. Seedling selection 8. A combination of the above
9. other_____

If H29=1, Would you say that the training helped improve their cocoa farming practices? [ ] H31
No. 0; Yes. 1; Don't know. 2

Are there any new cocoa management practices they adopted as a result of the training? [ ] H32
1. Pruning 5. Grafting
2. Fermentation 6. Rat control
3. Drying 7. Other black pod control
4. Seedling selection 8. A combination of the above

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I. Cocoa production habits

What would the **main reason** for you to increase the amount of time you spend on cocoa? [ ] I1

1 Higher cocoa price
2 My household expenses go up
3 When price of other crops goes down
4 More training on proper cocoa management
5 If I could get more help with my other farming activities
6 If Government would improve road access to market
7 If I could get access to improved cocoa fermentation and drying facilities
8 If I could get access to improved cocoa seedling varieties
9 Other_____(specify)

What would be the **second most important** reason for you to increase the amount of time you spend on cocoa? [ ] I2

1 Higher cocoa price
2 My household expenses go up
3 When price of other crops goes down
4 More training on proper cocoa management
5 If I could get more help with my other farming activities
6 If Government would improve road access to market
7 If I could get access to improved cocoa fermentation and drying facilities
8 If I could get access to improved cocoa seedling varieties
9 Other_____(specify)

What would be the **main reason** for not increasing the amount of time your spend on cocoa? [ ] I3

1 Too bust with producing food for family
2 Too busy producing other cash crops
3 Poor road or sea access to market
4 Too busy looking after children
5 Too busy with village activities
6 Poor access to equipment for processing cocoa (dryers, fermentaries)
7 Poor access to improved cocoa seedlings
8 No training on proper cocoa management methods
9 Other _____(specify)

What would be the **second most** important reason for not spending more time on your cocoa [ ] I4

1 Too busy with producing food for family
2 Too busy producing other cash crops
3 Poor road or sea access to market
4 Too busy looking after children
5 Too busy with village activities
6 Poor access to equipment for processing cocoa (dryers, fermentaries)
7 Poor access to improved cocoa seedlings
8 No training on proper cocoa management methods
9 Other_____(specify)

	in the last 12 months		in the last 5 years?
Have you helped another household with their cocoa production activities, such as harvesting or processing...	[ ] I5		[ ] J5a
	0=No; 1= Yes		0=No; 1= Yes

Have other household helped you with cocoa production activities, such as harvesting or processing...

	in the last 12 months		in the last 5 years?
	[ ] I6		[ ] J6a
	0=No; 1= Yes		0=No; 1= Yes

Over the last 12 months, have members of your household kept paper records of...

	0=No; 1= Yes	
Total number of cocoa seedlings planted	[ ] I7	
Total amount of cocoa beans produced	[ ] I8	
Price received for cocoa sold	[ ] I9	
Quality characteristics of cocoa sold	[ ] I10	

	in the last 12 months	in the last 5 years?
Have you or any member of your household planted any new cocoa trees....	[ ] I11	[ ] I11a
	0=No; 1= Yes	0=No; 1= Yes

If I11 = Yes (1) skip to I14

What was the **main reason** for not planting any new cocoa? [ ] I12

1 No spare land
2 Not enough time
3 Too much rain
4 No access to improved cocoa s
5 Price for cocoa too low
6 Too many pests and diseases (rats, black pod)
7 Natural disaster
8 Other _____(specify)

What was the **second most important** reason for not planting more cocoa trees? [ ] I13

1 No spare land
2 Not enough time
3 Too much rain
4 No access to improved cocoa s
5 Price for cocoa too low
6 Too many pests and diseases (rats, black pod)
7 Natural disaster
8 Other _____(specify)

What was the **main reason** for planting new cocoa? [ ] I14

1 Cocoa pirce high
2 Other crop prices low
3 Given new seedlings
4 Higher expenses
5 Other_____(specify)

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J. Cocoa Buyer Relations

Enumerator to answer: Household sold any cocoa in the last 12 months		J1	
If K1=No (0), skip to next page	0. No; 1. Yes		
How do you usually market for cocoa?		J2	
1. sell to cooperative	5. Other _____		
2. Sell to man in my village			
3. Sell to trader from other village/island			
4. Buy cocoa from other men and arrange transport to buyer			
How many cocoa buyers did you [.....]		J3	
1. speak to over the last year			
2. actually sell your product to?			
When do you usually first communicate with a cocoa buyer?		J4	
1. Before harvest	3. When you are finished processing cocoa		
2. After harvest begins	4. Don't communicate		
	5. Other _____		
How do you usually communicate with your cocoa buyer(s)?		J5	
1. Mobile phone	4. At village meeting		
2. Buyer comes to the farm	5. Through intermediary person		
3. Farmer goes to buyer 's place	6. Through cooperative/group		
What type agreement do you usually have with the buyer?		J6	
1. No agreement prior to sale	4. Member of co-op; always sell to co-op		
2. Oral/verbal agreement	5. Other		
3. Written agreement			

What is specified in the agreement with the buyer?			
0. No; Yes 1. Please number every box			
There is nothing specified in the agreement			J7.1
Price			J7.2
Quantity			J7.3
Grade/quality			J7.4
Time of delivery			J7.5
Time of payment			J7.6
Removal of broken or slaty beans			J7.7
Removal of beans of the wrong colour			J7.8
Have the requirements in your agreements with your buyer changed over the last five years?			J8
1. I don't have an agreement	4. No change		
2. More requirements	5. Not applicable (e.g. first time sale)		
3. Less requirements	6. Other_____		
Describe your price bargaining position with the cocoa buyers.			J9
1. I always accept the price he offers	3. I usually bargain with him.		
2. I sometimes bargain with him	4. I set the price and don't bargain.		
	5. Other_____		
Has your price bargaining postion with cocoa buyers changed over the last five years?			J10
1. I have more bargaining power than I used to			
2. No, it hasn't changed.			
3. I have less bargaining power than I used to.			
4. Not applicable (e.g. first time)			

Section K. Bank Accounts and Credit

	Now		Five years ago	
Does any member of your household have a bank account?		K1		K1a
	0 No 1 Yes		0 No 1 Yes	
If K1= No (0), what is the main reasons why no one in your household has a bank account?				K2
1 No bank nearby	4 No need			
2 Don't have enough money for minimum deposit	5 Fees are too high; not worth it			
3 Don't have the right documents to open an account	6 Other (specify_____)			
In the last 5 years, did anyone in your household borrow money from a friend or relative, a bank or microfinance agency?				K3
			0 No 1 Yes	

If K3= No (0), skip to next page

If K3= Yes (1), proceed to K4

Enumerator: For each **cash loan** , fill in one line

	What year did you borrow money?	Who did you ask for a loan or credit or borrow money?	What was the money used for?	Were you able to repay the loan?	Has it become harder or easier to access a loan in the last 5 years?	How has your need to access credit changed in the last 5 years?
		1 Relative	1 Housing	1 Yes, all	1. Easier	1. Higher
		2 Friend	2 Buy Land	2 Only part	2. Harder	2. Lower
		3 Money lender	3 Buy livestock or smallstock (cows, pigs, chickens or other animals)	3 Not at all	3. No difference	3. No difference
		4 Cooperative	4 Buy agricultural equipment	4 Not yet due		
		5 Bank	5 Buy transport (truck, boat, bike)			
		6 Other	6 Starting a business			
			7 Pay for hospital bill			
			8 Pay for education			
			9 Pay for a Wedding, Funeral, Circumcision or other ceremony			
			10 Other			
Loan #	K4	K5	K6	K7	K8	K9
1						
2						
3						
4						
5						
6						
7						

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L. Village activities							
				In the last 12 months		5 years ago	
How often do people in your village get together with other members of your village for a chief or community day?					L1		L1a
1 Once per week	3 Once every two weeks	5 Less than once every month					
2 Twice per week	4 Once a month	6 Never					
Does this usually last for a full day or a half day?					L2		
1. half day							
2. Full day							
How often do you participate in chief or community day				In the last 12 months		5 years ago	
1 Once per week	3 Once every two weeks	5 Less than once every month			L3		L3a
2 Twice per week	4 Once a month	6 Never					
				In the last 12 months		5 years ago	
How often do people in your village get together with other members of your village for a church day?					L4		L4a
1 Once per week	3 Once every two weeks	5 Less than once every month					
2 Twice per week	4 Once a month	6 Never					
Does this usually last for a full day or a half day?					L5		
1. half day							
2. Full day							
How often do you participate in church day?				In the last 12 months		5 years ago	
1 Once per week	3 Once every two weeks	5 Less than once every month			L6		L6a
2 Twice per week	4 Once a month	6 Never					
Does this usually last for a full day or a half day?					L7		
1. half day							
2. Full day							
How often do you participate in youth day?							
1 Once per week	3 Once every two weeks	5 Less than once every month			L8		L8a
2 Twice per week	4 Once a month	6 Never					
Does this usually last for a full day or a half day?					L9		
1. half day							
2. Full day							
How often do you participate in kindagarten day?							
1 Once per week	3 Once every two weeks	5 Less than once every month			L10		L10a
2 Twice per week	4 Once a month	6 Never					
Does this usually last for a full day or a half day?					L11		
1. half day							
2. Full day							
Do you participate any other regular village activities? Select from the list				In the last 12 months		5 years ago	
Women's day					L12		L12a
Men's day					L13		L13a
Village co-operative day					L14		L14a
Other _____					L15		L15a
Is there a fine for not participating in any of these activities?			L16				
		0. No. Yes. 1					
If L16= 1 (Yes), How much is the fine? (Vatu)			L17				
				In the last 12 months		5 years ago	
Apart from these activities, how often do members of your village meet to discuss village affairs?					L18		L18a
1 Once per week	3 Three times per week	5 Once every month					
2 Twice per week	4 Once every two weeks	6 Less than once a month					
				In the last 12 months		5 years ago	
Have you ever joined with other men in a work gang to work on behalf of other members of the community, without payment?					L19		L19a
				0. No. Yes. 1		0. No. Yes. 1	

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If L19=1 (yes), what was your **most important reason** for participating in such a work gang?						L20
1. So that I can get access to a work gang in the future						
2. So that the man I helped will help me in someway in the future						
3. So that other members of the community will help me in some way in the future						
4. Because it is expected of me by my community						
5. other (please add) _____						

Activity		In the past 12 months, have any members of your household attended.....	**If L21=Yes (1)**, In the past 12 months, How many of these events have	Over the past 5 years, has this kind of activity become more or less frequent? 1. More frequent 2. Less frequent 3. The same
		0. No; 1. Yes	Number	
		L21	L22	L23
Funeral ceremony	a			
Wedding ceremony	b			
Circumcision ceremony	c			
Nimangi grading ceremony	d			
Peace ceremony	e			
Other kastom ceremony	f			

Appendix 2 – Best Worst Cards

K. BEST-WORST

We would now like to ask you 11 questions regarding the importance and motivations for you to engage in community and village activities.

Community and village activities include:

1. Spending your time working for the community or village on Chief's day.

2. Spending your time working for the community or village on church day.

3. Spending your time working for the community on youth day, kindergarten day, women's day or men's day

4. Spending your time helping other households at busy times, such as harvesting crops, planting the food garden or processing cobra or cocoa.

We are interested in knowing the importance of 11 different motivations or reasons why you spend your time and money on the community activities like the ones listed above.

The 11 motivations are:

Maintain traditional village life

It is important to spend money and my time to maintain the traditional way of community life.

Respect for elders and chiefs

It is important to spend money and my time to show respect for the requests of my elders and chiefs.

Respect requests of other families

It is important to spend money and my time to respect the requests of other families.

Respect requests of priest or reverend

It is important to spend money and my time to respect the requests of my priest or reverend.

Improve the status of my family

It is important to spend money and my time on community activities to improve the standing of my family in the community.

Improve my own status

It is important to spend money and give my time so others see me as more important, a ‘bigger man’.

Ensure help with my family with ceremonies

It is important to spend money and my time on community activities so that other families will provide gifts of food and money when someone in my family gets married, dies or gets circumcised

Ensure labour for our harvest

It is important to spend money and my time to ensure that other families will help me when I need help harvesting my crops

Gain access to land

It is important to spend money and my time to ensure that other families will help me when I want to access more land

Ensure support in a dispute

It is important so that other families support my family if we are engaged in a dispute

Assistance with food or money when needed

It is important so that other families support my family if we need assistance with food or money in times of need

The following example illustrates how to answer each question if you thought that "Gain access to land" was the most important attribute and

"Respect requests of other families" was the least important attribute. This is only an example. Please answer questions A-K based on your personal preferences.

EXAMPLE ONLY:

It is important so that other families support my family if we need assistance with food or money in times of need

The following example illustrates how to answer each question if you thought that "Gain access to land" was the most important attribute and "Respect requests of other families" was the least important attribute. This is only an example. Please answer questions A-K based on your personal preferences.

EXAMPLE ONLY:

Example		
Most important	**Of these, which are the most and least important to you?**	**Least**

(tick one box)		important (tick one box)
☐	Ensure labour for our harvest	☐
✓	Gain access to land	☐
☐	Respect requests of priest or reverend	☐
☐	Gain access to land	☐
☐	Respect requests of other families	✓

END EXAMPLE

QUESTION A

For each of the following 11 questions (A-K), ***check only one attribute as the MOST important*** (left hand side) and also ***check only one attribute as the* LEAST *important*** (right hand side)**.**

A. Considering the five characteristics presented below, please tick one box in the left column to indicate the characteristic that is ***MOST important*** to you and please tick one box in the right column to indicate the characteristic that is ***LEAST important*** to you. Please tick only one box per column.

Question A

Most important (tick one box)	Of these, which are the most and least important to you?	Least important (tick one box)
☐	Assistance with food or money when needed	☐
☐	Ensure help with my family ceremonies	☐
☐	Show respect for elders and chiefs	☐
☐	Improve my own standing	☐
☐	Maintain traditional village life	☐

B. Considering the following five characteristics presented below, please tick one box in the left column to indicate the characteristic that is ***MOST important*** to you and please tick one box in the right column to indicate the characteristic that is ***LEAST important*** to you. Please tick only one box per column.

Question B

Most important (tick one box)	Of these, which are the most and least important to choose a …	Least important (tick one box)
☐	Ensure support in a dispute	☐
☐	Show respect for elders and chiefs	☐
☐	Gain access to land	☐
☐	Improve the standing of my family	☐
☐	Ensure help with my family ceremonies	☐

C. Considering the following five characteristics presented below, please tick one box in the left column to indicate the characteristic that is ***MOST important*** to you and please tick one

box in the right column to indicate the characteristic that is ***LEAST important*** to you. Please tick only one box per column.

Question C

Most important (tick one box)	Of these, which are the most and least important to you?	Least important (tick one box)
☐	Maintain traditional village life	☐
☐	Gain access to land	☐
☐	Respect requests of priest or reverend	☐
☐	Respect requests of other families	☐
☐	Show respect for elders and chiefs	☐

D.Considering the following five characteristics presented below, please tick one box in the left column to indicate the characteristic that is ***MOST important*** to you and please tick one box in the right column to indicate the characteristic that is ***LEAST important*** to you. Please tick only one box per column.

Question D

Most important (tick one box)	Of these, which are the most and least important to you?	Least important (tick one box)
☐	Ensure help with my family ceremonies	☐
☐	Respect requests of priest or reverend	☐
☐	Ensure labour for our harvest	☐
☐	Assistance with food or money when needed	☐
☐	Gain access to land	☐

E.Considering the following five characteristics presented below, please tick one box in the left column to indicate the characteristic that is ***MOST important*** to you and please tick one box in the right column to indicate the characteristic that is ***LEAST important*** to you. Please tick only one box per column.

Question E

Most important (tick one box)	Of these, which are the most and least important to you?	Least important (tick one box)
☐	Show respect for elders and chiefs	☐
☐	Ensure labour for our harvest	☐
☐	Improve my own standing	☐
☐	Ensure support in a dispute	☐
☐	Respect requests of priest or reverend	☐

F.Considering the following five characteristics presented below, please tick one box in the left column to indicate the characteristic that is ***MOST important*** to you and please tick one box in the right column to indicate the characteristic that is ***LEAST important*** to you. Please tick only one box per column.

Question F

Most important (tick one box)	Of these, which are the most and least important to you?	Least important (tick one box)
☐	Gain access to land	☐
☐	Improve my own standing	☐
☐	Improve the standing of my family	☐
☐	Maintain traditional village life	☐
☐	Ensure labour for our harvest	☐

G.Considering the following five characteristics presented below, please tick one box in the left column to indicate the characteristic that is ***MOST important*** to you and please tick one box in the right column to indicate the characteristic that is ***LEAST important*** to you. Please tick only one box per column.

Question G

Most important (tick one box)	Of these, which are the most and least important to you?	Least important (tick one box)

☐	Respect requests of priest or reverend	☐
☐	Improve the standing of my family	☐
☐	Respect requests of other families	☐
☐	Ensure help with my family ceremonies	☐
☐	Improve my own standing	☐

H. Considering the following five characteristics presented below, please tick one box in the left column to indicate the characteristic that is ***MOST important*** to you and please tick one box in the right column to indicate the characteristic that is ***LEAST important*** to you. Please tick only one box per column.

Question H

Most important (tick one box)	**Of these, which are the most and least important to you?**	**Least important (tick one box)**
☐	Ensure labour for our harvest	☐
☐	Respect requests of other families	☐
☐	Assistance with food or money when needed	☐
☐	Show respect for elders and chiefs	☐
☐	Improve the standing of my family	☐

I. Considering the following five characteristics presented below, please tick one box in the left column to indicate the characteristic that is ***MOST important*** to you and please tick one box in the right column to indicate the characteristic that is ***LEAST important*** to you. Please tick only one box per column.

Question I

Most important (tick one box)	**Of these, which are the most and least important to you?**	**Least important (tick one box)**
☐	Improve my own standing	☐
☐	Assistance with food or money when needed	☐
☐	Ensure support in a dispute	☐

☐	Gain access to land	☐
☐	Respect requests of other families	☐

J.Considering the following five characteristics presented below, please tick one box in the left column to indicate the characteristic that is ***MOST important*** to you and please tick one box in the right column to indicate the characteristic that is ***LEAST important*** to you. Please tick only one box per column.

Question J

Most important (tick one box)	Of these, which are the most and least important to you?	Least important (tick one box)
☐	Improve the standing of my family	☐
☐	Ensure support in a dispute	☐
☐	Maintain traditional village life	☐
☐	Respect requests of priest or reverend	☐
☐	Assistance with food or money when needed	☐

K.Considering the following five characteristics presented below, please tick one box in the left column to indicate the characteristic that is ***MOST important*** to you and please tick one box in the right column to indicate the characteristic that is ***LEAST important*** to you. Please tick only one box per column.

Question K

Most important (tick one box)	Of these, which are the most and least important to you?	Least important (tick one box)
☐	Respect requests of other families	☐
☐	Maintain traditional village life	☐
☐	Ensure help with my family ceremonies	☐
☐	Ensure labour for our harvest	☐
☐	Ensure support in a dispute	☐