This study sets out to explore the concept of risk management within the framework of the agricultural financial markets in developing countries. The framework provides opportunities for innovative agricultural insurance tools. Microinsurance and index-based indemnification mechanisms have been recognized as potential instruments for transferring risks by providing cover, or indemnification, against losses in a disaster event. This insurance product provides an easily accessible insurance cover for small-scale assets at affordable premiums while keeping transaction and other costs low. By protecting the poor from disaster losses and providing incentives for risk reduction, microinsurance is increasingly recognized as an important part of risk management. However, it was to be tested in Sri Lanka. The main objective of this study was to examine the possibility and suitability of introducing index-based microinsurance for the small-farmers in paddy crop cultivation in the context of production risk caused by natural disasters.

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Heenkenda

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With Special Reference to the Paddy Sector in Sri Lanka

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List of Abbreviations

AAIB	Agricultural and Agrarian Insurance Board
ACCDC	All Ceylon Community Development Council
ADB	Asian Development Bank
ALMAO	All Lanka Mutual Assurance Organisation
ANOVA	Analysis of Variance
ASC	Agrarian Service Center
ASCAs	Accumulating Savings And Credit Associations
ANOVA	Analysis of Variance
ATL	Amana Takaful Insurance
BASIX	Bhartiya Samruddhi Investments and Consulting Services Ltd
CAT bond	Catastrophe-linked security bond
CBOs	Community -based Organizations
CBFI	Community-based Financial Intermediaries
CRED	Center For Research on The Epidemiology of Disaster
CV	Contingent Valuation
DMC	Disaster Management Centre
ENSO	El Ni˜no–Southern Oscillation
FAO	Food and Agriculture Organization of the United Nations
FO	Farmers' Organizations
GIS	Geographical Information System
GTZ	German Company for International Cooperation
IBMS	Index-based Microinsurance Scheme
IBSL	Insurance Board of Sri Lanka

IFAD	International Fund for Agricultural Development
IWMI	International Water Management Institute
JICA	Japanese International Cooperation
MDGs	Millennium Development Goals
MFI	Microfinance Institution
MIA	Microinsurance Agency Holdings
MRSA	Microfinance Regulatory and Supervisory Authority
NGO	Non-Governmental Organization
NMC	National Meteorological Centre
OFDA	Office of U.S. Foreign Disaster Assistance
PCA	Principal Components Analysis
ROSCAs	Rotating Savings And Credit Associations
RRDI	Rice Research and Development Institute
SEEDS	Sarvodaya Economic Development Services Ltd
SLNAP	Sri Lanka National Agricultural Policy
SLRs	Sri Lankan Rupees
UNISDR	United Nations International Strategy for Disaster Reduction
WDF	Women Development Federation
WTJ	Willingness To Join
WTP	Willingness To Pay

CHAPTER 1
Introduction

This study sets out to explore the concept of risk management within the framework of a developing country's agriculture and to identify suitable risk management mechanisms for the protection of paddy crop to protect against production loss caused by natural disasters. More specifically, it examines the possibility of introducing index-based microinsurance in Sri Lanka. This chapter begins with an examination of the background of the study and research problem, particularly highlighting the Sri Lankan context. Following this, the objective and research questions to be investigated are presented, and the chapter concludes with a discussion of the significance of the study and the most important points in the debate occurring in the present microinsurance literature. Finally, an overview of the structure of the book is presented.

1.1 General Background

Whether people are wealthy or poor, risk cannot be avoided. It can however, be managed. Risk management means identifying a risk and a range of options, then evaluating, selecting and implementing a response to this risk (Hardaker, Huirne, Ruud, & Anderson, 1997). Risk management options have developed through a body of research; this research is discussed in detail in chapter 2. However, the main idea of risk management is to deal with the fluctuation of income and consumption through a proper strategy. It is now widely acknowledged that a major aspect of people's livelihood involves mechanisms to cope with risk and shocks. Hence, households will make certain decisions in anticipation of risk or in order to mitigate the threat of failure to their well-being. Very low-income agricultural households in rural areas have developed a number of mechanisms to buffer them from, or at least to minimize the effects of, risk related shocks (Dercon, 2005; Zimmerman & Carter, 2003).

Risk management in agriculture is important not only at national level but at global level. Risk and uncertainty are classic features of agricultural production due to natural disaster, which can vary widely from year to year and cause wide swings in yield (Hardaker, Huirne, Anderson & Lien, 2004). These wide swings in yield generate high variability in the household income of farmers. The swings in farmer income significantly reduce the household welfare of farmers in the short run and can result in serious repercussions for farmer households in the absence of effective risk management tools, especially when those swings are systemic shocks to the whole sector (Pritchet, 1997). Management of risks at farm and sector level is starting to be recognized as a critical factor in achieving the Millennium Development Goals (MDGs) agreed to by the signatory nation/states in the year 2000.

Poverty is intimately tied to vulnerability to risk. The poor are constantly exposed to risks and are the most vulnerable to loss and its associated shocks. A significant part of the literature on risk management is associated with protection against poverty, particularly in developing countries (Dercon, 2005; World Bank, 2000). The body of literature related to development points to the absence of formal financial services as a major factor that locks people into poverty and slows economic growth in the rural sector (Barrett et al., 2007). The principal formal mechanism for risk management is insurance. Formal insurance supports the management of risks and the smoothing of the household asset formation process. Agricultural insurance is one of the strategies to tackle the problem of risks in farming. Although largely still limited to higher-income clients, insurers globally are slowly finding ways of extending their services to lower-income households. It is also realized that in order to achieve the MDGs by 2015, and in particular MDG 1(Eradicate extreme poverty & hunger) [1] , a more effective approach to innovation for agricultural sector will be needed.

Microinsurance, a subset of financial tools that belong to microfinance is now widely recognized and is emerging as a flexible and powerful innovative instrument in developing countries. Microinsurance specifically sets out to provide affordable and accessible insurance to low-income people who cannot gain access to traditional forms of insurance (Churchill, 2006; Osgood & Warren, 2007). The microinsurance movement is relatively recent; it is becoming an increasingly popular way of addressing health, mortality and weather shocks. Recent experiences emerged from innovative instruments to overcome the shortcomings of traditional agricultural insurance and piloted index-based microinsurance systems implemented in communities with high vulnerability to various disasters in developing countries. This has provided a fertile ground to deepen our understanding of how agricultural microinsurance could be used as a vehicle for stabilizing farmer incomes and for providing assistance to farmer communities to enter into a sustainable growth path (Giné, Townsend, & Vickery, 2007a; Hardaker et al., 2004; Lilleor, Giné, Townsend, & Vickery, 2005; Mechler, Linnerooth-Bayer, & Peppiatt, 2006).

[1] The United Nations (UN) Website. (n.d.). Retrieved January 26, 2010, from http://www.un.org/millenniumgoals/poverty.shtml

1.2 The Sri Lankan Context

Agriculture has been Sri Lanka’s main livelihood since ancient times. The agricultural sector plays an important role in the economic and social development of the country. Nearly 90 percent of the poor live in rural agricultural areas. Approximately 30 percent of Sri Lanka's 65,610 sq kilometers is agricultural land with 75 percent being in small-scale (peasant) farms (Department of Census and Statistics of Sri Lanka, 2008, p.10). However, with rice being the dominant crop in Sri Lanka, the paddy sector is dominated by a large number of small-scale subsistence farmers. Rice is the staple food of the 20.1 million people in the country and the rice sector alone contributes 30 percent to the agricultural gross domestic product and approximately 18 percent of the national gross domestic product. It is the livelihood of more than 1.8 million farmers and more than 32 percent of the total labour force is directly involved in the rice sector, which comprises 20 percent of the total population. Moreover, agriculture is an important contributor to the economy. This sector supplies most of the food requirements and is the source of raw material for a number of agro-industries, which have a high potential to reduce unemployment and thus alleviate poverty (Central Bank of Sri Lanka, 2008, p.88; Department of Census and Statistics of Sri Lanka, 2008, pp.10-12)

In spite of transformation since the end of colonial rule, every government has identified the importance of this sector and taken several steps to improve the paddy/rice industry. Food security has been a major policy goal of successive governments. However, Sri Lanka has been classified as a low income food deficit country for which food availability depends predominantly on rice production. The present government has emphasized the development of the agricultural sector, with a particular emphasis on rice farming, for achieving as much self-sufficiency as possible in food. The sector also plays a critical role in stabilizing the incomes of urban dwellers by containing unwanted price increases of rice and other food commodities. The government envisages achieving food security by improving farm productivity, increasing the area of cultivation and through better management of agricultural technology.

Successive governments have historically adopted a variety of ad-hoc interventions such as incentives and direct subsidies, agricultural inputs, supplies and services, agricultural credit, cultivation loan repayment exemption and crop insurance. One of the biggest subsidies is through the provision of water virtually free of charge for paddy cultivation. The cost to the government for building and maintaining the irrigation infrastructure is relatively large. The fertilizer subsidy program is another long lasting, and highly expensive policy which has been implemented to promote the paddy sector in Sri Lanka. Under the 2010 market prices, the government spent 50 billion Sri Lankan rupees per year on fertilizer subsidy, which is around 2.5 percent of government expenditure (Central Bank of Sri Lanka, 2010, statistical appendix table 73). Paddy cultivation provides employment opportunities for more than 1.8 million farmers in the country, and hence the government has been under constant pressure to continue the fertilizer subsidy (Weerahewa, Kodithuwakku, & Ariyawardana, 2010, p.1). The Sri Lankan government considers fertilizer subsidy expenditure as an investment in real terms and is confident that this should contribute to the economic development of the country as well as a means of sustaining the farmers. To maintain the stability of the paddy market price during harvest time, the Sri Lankan government introduced a policy in 2009, whereby farmers are required to sell 500 kg of paddy per hectare to the government at a guaranteed price to be eligible for the fertilizer subsidy (Weerahewa, Kodithuwakku, & Ariyawardana, 2010, p.1).

In addition, the government also provides a number of tax rebates for importing agricultural machinery and equipment to promote mechanization of agricultural processes, with the objective of replacing labour-intensive operations to reduce costs of production. A pension scheme for farmers is in operation to assure a source of income if farmers are disabled and/or when they retire. Agricultural research and extension is primarily a service-oriented function of the government. Rice research and development is a function of state owned institutions to develop and disseminate technology through extension services to meet its core objective of self-sufficiency in rice. Agricultural credit schemes with low interest rates for farmers are promoted with state patronage under a new comprehensive rural credit programme. Above all, the government also maintains a rice price stabilization scheme to ensure that farmers receive a reasonable income from paddy cultivation. However, lacking proper risk management mechanism, all subsidies and encouragement policies in agriculture continue to be a huge burden on the government budget.

Sri Lankan agriculture is highly vulnerable to risk and uncertainty as it frequently suffers from natural disasters, among which water-induced disasters such as floods, droughts and landslides are the most common and destructive (Disaster Management Centre - Sri Lanka, 2006). Natural disasters can have devastating consequences for the livelihood of the food insecure (WFP, 2007). A study conducted by the country at household level in the Sri Lankan microfinance sector showed that risks and vulnerabilities faced by households which have encountered natural calamities such as floods and droughts and crop failures account for almost 40 percent of the (Tilakaratna, Wickramasinghe, & Kumara, 2005, p.32).

During the 2004 drought, for example, an estimated 52,000 hectare of crops were damaged in seven districts, and the government had to appeal for assistance to provide food rations for over 1 million people during a six-month period (Ministry of Social Welfare- Sri Lanka, 2008, p.11). The latest floods in 2011 were the worst in recent history and the most severely affected part of the country was the Eastern province. Sri Lanka's agricultural ministry reported that 21percent of the country's paddy crop has been destroyed (Disaster Management Center-Sri Lanka, 2011, p. 31; Ministry of Agriculture-Sri Lanka, 2011, p.12).

The country remains vulnerable to multiple natural disasters causing substantial threats to the food security situation of the majority of the population which depends on agriculture as the main source of income. Due to the high degree of uncertainty about the future climatic conditions new innovative financial mechanisms are required to protect the agricultural assets in the advent of such weather-related risks and this has seen researchers and institutes recommending various methods to mitigate these risks. Most researchers have recommended crop insurance as a solution to these weather related risks (UNCTAD, 1995).

Sri Lanka has made substantial gains in reducing poverty since Independence. Despite a legacy of impressive achievement in human development indicators, poverty levels in Sri Lanka remain high in certain respects. The poor farmer in the country is caught in the vicious cycle of poverty, limited resources, and low inputs for production and limited output. Notwithstanding the assured supply of some of the inputs like water, the farmer cannot obviate the risks emerging from the vicissitudes of nature. For almost all the farmers operating at a marginal level, the capital they inject into their enterprise is hard-earned money. More often than not, this money is raised through loans from banks and private money lenders. Hence, they cannot afford to experience crop loss since this would leave them paralyzed for the next cropping season. The poor farmer thus becomes entrenched in dire poverty and need. He has no other recourse but to avail himself of agricultural insurance which seeks to create a stabilizing effect on farm income (Ekanayake, 1991). Poverty changes from place to place and across time. Poverty means more than just having an income below the so called poverty line. It is also about the inability to sustain a specified level of well-being over a period of time. Poverty is neither linear nor static; poor people fluctuate above and below the poverty line, so that today's not-so-poor may well be tomorrow's poorest, and vice-versa. Poverty has many dimensions and it has been examined through a variety of indicators such as levels of income and consumption, social indicators and indicators of vulnerability to risks.

Agricultural intensification and technology development in farming usually involves investment. Such changes also frequently alter the risk profile of the enterprise. The agricultural policy recommendations formulated by the national development council in Sri Lanka has stated that within the open economic transformation process, to attract Foreign Direct Investment (FDI) and new technologies, there should be a one organization structure to facilitate the whole process of investments in the agricultural sector by building partnerships, joint ventures with the foreign investors, adopting existing incentive packages designed by the Board of Investments (BOI) in Sri Lanka. The formation of farmer companies is a strategy adopted by government to transform traditional small-scale farming into commercialized business ventures (Jayaratne, 2000). These companies are expected to address major problems faced by farmers such as procurement of inputs, obtaining of technology, value addition to their products, and marketing. They are also expected to demonstrate capacity to adjust to the forces of free trade in the market economy with forward contracts generating resources to invest in farmlands with prudent management practices. Under new agricultural policies introduced in 1996, farmer companies were considered as the main institutional strategy of agriculture and irrigation development (Wijeratne, 1997). The traditional farming systems had to be converted to commercialized agricultural ones, a necessary pre-requisite in improving the access of insurance availability. However, the provision of crop insurance is a useful and significant aspect of a comprehensive and integrated policy for increasing agricultural productivity. Moreover, in order to overcome the lack of willingness of low-income farmers to invest in new technology, and the chronic financial debility of the financial institutions that lend to them, the new technology will offer them an increase in expected income and enhance their incentive to invest in green revolution technology such as fertilizer, new seeds and irrigation (Binswanger & Sillers, 1983; Lele, Christiansen, & Kadiresan, 1989).

Currently, Sri Lankan farmers can insure most of their crops through the conventional crop insurance schemes provided by the government-owned Agricultural and Agrarian Insurance Board (AAIB). Although the Board has been running for more than five decades, voluntary participation has drastically decreased. Its level of penetration among potential clients is currently less than 5 percent (AAIB, 2010, p.123). One of the main causes for the low confidence in this scheme is the lack of transparency in loss assessment and underestimation in indemnity payment (Rambukwella, Vidanapathirana, & Somaratne, 2007). Moreover, rain-fed areas are not promoted for insurance by the Board. However, according to the national records of crops classified in the sown by irrigation category, in the last ten years (2000-2010), crops sown on rain-fed areas have accounted for a contribution of 24 percent. AAIB insurance products operate as individual contracts with indemnity based on the individual's own yield. Usually this type of contract suffers from asymmetric information problems such as moral hazard and adverse selection and the high administrative cost is another impediment. Moreover, the government schemes are not based on actuarial principles and so are deemed unsustainable. Performance of publicly supported crop insurance has been inefficient when all costs are considered (Skees, 2003, p.15).

In this context, the Sri Lanka National Agricultural Policy (SLNAP) proposes to "introduce appropriate agricultural insurance schemes to protect farmers from the risks associated with natural calamities" (SLNAP, 2006, p.6). The draft version circulated for comment further highlighted that "a national agricultural insurance scheme will be implemented to cover all farmers and all crops throughout the country to insulate the farmers from financial distress caused by natural disaster, making agriculture financially viable" emphasizing "collaboration with public and private sector" (SLNAP-D, 2006, p.11). Therefore, agricultural insurance would appear to be among the more important, of the many risk mitigation measures adopted in the country. Further to this, the Ten Year Horizon Development Framework (2006-2016) identifies "promoting & strengthening agricultural insurance facilities and promoting out-reach programmes of banks for agricultural lending" as one of the key policies of the government (Ministry of Finance- Sri Lanka, 2006, p.23). Current government policy has highlighted development in the agricultural sector, with particular emphasis on rice farming, with the aim of achieving as much self-sufficiency as possible where matters of food are concerned. The government envisages achieving food security by improving farm productivity, increasing the area of cultivation and better management of agricultural technology (Ministry of Finance-Sri Lanka, 2005 & 2006). This study will help highlight the critical role of microinsurance in stabilizing farmer incomes, thereby providing the necessary impetus for bringing Sri Lankan agriculture onto a sustainable growth path.

1.3 Objective of the Study

Agricultural financial markets in developing countries provide opportunities for innovative agricultural insurance. Microinsurance and index-based indemnification mechanisms (an index-based insurance product) have been recognized as risk mitigation tools in present day agricultural risk management (Dercon, Kirchberger, Gunning, & Platteau, 2008; Roth & McCord, 2008; Skees & Barnett, 2006; Patt, Peterson, Carter, Velez, Hess, & Suarez, 2009). The incorporation of these two concepts can be called Index-based Microinsurance Scheme (IBMS). However, it has yet to be tested in Sri Lanka. The main objective of this study is to examine the possibility and suitability of introducing index-based microinsurance for paddy crop cultivated by small-scale farmers in the context of production risk caused by natural disasters.

This study also aims to gain an understanding of the socio-economic context in which a microinsurance scheme can become available to a majority of farmers. This would require us to situate farmers in their respective socio-economic backgrounds so that relevant conclusions can be made in specific contexts. Hence, the study has the following research questions.

1.4 Research Questions

Identification of Market - Risks and Survival Strategies of Agricultural Households

- What are the most important natural disaster risks for paddy farm households in terms of their financial pressure and paddy production?
- What are the strategies employed for risk management among Sri Lankan paddy farmers?

Microinsurance for Agricultural Risk

- What are the biggest gaps in existing risk-management strategies that can be replaced by microinsurance?

Farmers Behavior and Demand of the Potential Market

- Which factors are most influential on farmers' crop insurance purchasing decisions in Sri Lanka?
- What are the most important gaps in insurance literacy-knowledge (understanding of concepts), skills (being able to use insurance for effective risk-management), and attitudes (opinions, culture and self confidence) towards it and what influence do they have on launching new microinsurance schemes?
- What are the farmers’ networking behaviors as far as microinsurance development is concerned?
- What exactly is “willingness to pay behavior” and what are farmer's preferences for insurance attributes in microinsurance?

Indemnification Mechanism and Delivery Method

- What pre-conditions and infrastructure are available for introducing the index-based indemnification method for the paddy sector?

- What is the existing policy and regulatory framework for microinsurance development and for increasing efficiencies of the insurance supply chain?
- What are the existing financial intermediaries, economic networks and potential farmer affiliated organizations for microinsurance delivery to farmers?
- What are the public private partnership opportunities for the delivery and development of market based microinsurance products?
- What is the potential institutional mechanism for agricultural microinsurance for Sri Lanka's paddy farmers?

1.5 Significance of the Study

Sri Lanka, with a large agricultural sector vulnerable to risk and uncertainty, provides an excellent background for undertaking an empirical study to deepen our understanding of the role of microinsurance in agricultural risk mitigation. In Sri Lanka, the author is unaware of any formal studies that have been specifically either on agricultural risk and risk management strategies at the household level, or on the potential of microinsurance. However, a few studies have reported on greater access to insurance products and financial risk management tools for health related life cycle risks at the household level (Wiedmaier-Pfister & Wohlner, 2004). Given the fact that rice is the staple food commodity of the country and consequently has socio-economic significance, it is natural for this study to have specific focus on the paddy sector. The paddy sector helps the economy by saving an enormous amount of foreign exchange and provides employment for a large segment of the rural population.

In Sri Lanka, the government-owned crop insurance scheme (AAIB) has been paying claims that were assessed based on individual losses. However, index-based indemnification mechanism may have a huge potential to attract small-scale farmers to microinsurance due to the low costs of the claim settlement process. To this date, only one feasibility study has been conducted on this subject by a commercial insurance company under the International Labour Organization (ILO) microinsurance facility program[2]. Its findings have not been published. We believe that this is the first study on possibility of implementation index-based indemnification mechanism for microinsurance in Sri Lanka.

Several models of microinsurance deliveries are currently in use internationally and propose alternative institutional approaches. Methods and models for delivering microinsurance products vary depending on the organization, institution, and provider involved. Thus, feasibility testing to determine the institutional framework of agricultural insurance in a developing country is currently lacking. Therefore, this study attempts to identify potential microinsurance delivery channels for Sri Lankan paddy farmers and contribute to policies that can facilitate the choice of appropriate delivery channel to provide microinsurance on a large scale in developing countries. The current study provides information helpful in lowering barriers to the implementation of IBMS as an additional risk management tool.

[2]International Labor Organization (ILO) Website. (n.d.). Retrieved September 03, 2010, from http://www.ilo.org/public/english/employment/mifacility/grantees/sanasa.htm

1.6 Outline of the Book

This book is comprised of nine chapters. After this introduction, chapter 2 reviews the risk and risk management strategies in a rural agricultural context. Chapter 3 concentrates on describing the research methodology, data collection and analysis used for this study. The background information from the surveys conducted in this research is presented and discussed in the chapter 4. This information provides a general explanation and extends the understanding of the behavior of potential market in the paddy sector in Sri Lanka. Chapter 5 presents the natural disaster risk and risk management strategies of rural paddy farm households in Sri Lanka. Chapter 6 attempts to explain the demand behavior for proposed index-based microinsurance by Sri Lankan paddy farmers and understand how insurance attributes that meet the needs and preferences of the farmers can be incorporated into the design of microinsurance products. Chapter 7 assesses the possibility of introducing an index-based indemnification mechanism for the Sri Lankan paddy sector. In this section, we review weather infrastructure, historical data availability in Sri Lanka and available measurement systems with emphasis on our surveyed area and related evidence thereof. Chapter 8 focuses on the existing insurance regulatory environment in Sri Lanka and potential delivery channels for the paddy sector. In addition, we discuss public policy towards government involvement. Chapter 9 is a brief summary, containing conclusions and policy implications that can be drawn from this study. It also suggests lessons learned from the process and possible areas of research in the future.