Weather Index Insurance for Maize Production in Eastern Indonesia

A FEASIBILITY STUDY

Supported by:

International Finance Corporation
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ACKNOWLEDGMENTS

IFC would like to thank AUSAID who provided generous funding for this study through its Smallholder Agribusiness Development Initiative (SADI) program. IFC would also like to thank Andrea Stoppa and Ornsaran Pomme Manuamorn, the key members of the Feasibility Study team and principal authors of the study. Additional thanks are owed to Sandro Calmanti, William Dick, and Erik Chavez, who along with Mr. Stoppa and Ms. Manuamorn, are part of the Agricultural Risk Management Team (ARMT) of the World Bank. Their technical and editorial contributions helped to make this paper possible.

IFC would also like to acknowledge the valuable inputs and data provided by Mr. Isa Rachmatarwata, Head of Insurance Bureau, Ministry of Finance, Dr. Mat Syukur, Department of Agriculture, and Dr. Andi Eka Sakya, National Weather Service (BMKG). The Indonesia General Insurance Association (AAUI) provided input and assistance throughout the study.

Grace Retnowati of IFC Indonesia was instrumental in managing the work from beginning to end, and provided invaluable guidance to the team. Roger Thomas Moyes, IFC Program Manager of the Access to Finance Program, served as final editor.

ACRONYMS & ABBREVIATIONS

AAJI	Asosiasi Asuransi Jiwa Indonesia
AAUI	Asosiasi Asuransi Umum Indonesia
ARD	Agriculture and Rural Development Department
ARG	Automatic Rain Gauges
ARMT	Agricultural Risk Management Team
ASEAN	Association of Southeast Asian Nations
AUSAID	Australian Agency for International Development
AWS	Automatic Weather Station
BAPEPAM	Badan Pengawas Pasar Modal
BCA	Bank Central Asia
BI	Bank Indonesia
BII	Bank International Indonesia
BISMA	Bina Insan Mandiri
BMKG	Badan Meteorologi Klimatologi dan Geofisikav
BNI	Bank Negara Indonesia
BPR	Bank Perkreditan Rakyat
BRI	Bank Rakyat Indonesia
CMFISA	Capital Markets and Financial Institutions Supervisory Agency
DAI	Dewan Asuransi Indonesia
EL	Expected Loss
ENSO	El Niño Southern Oscillation
FAO	Food and Agriculture Organization
FI	Financial Institution
GDP	Gross Domestic Product
HBA	Historical Burn Analysis
IDR	Indonesian Rupiah

IFAD	International Fund for Agricultural Development
IFC	International Finance Corporation
KUD	Koperasi Unit Desa
KYC	Know Your Customer
MFI	Microfinance Institution
MoA	Ministry of Agriculture
MPCI	Multi-peril Crop Insurance
MRG	Manual Rain Gauges
MSME	Micro and Small Medium Enterprise
NTB	Nusa Tenggara Barat
OECD	Organization for Economic Co-operation and Development
PNM	Permodalan Nasional Madani
R&D	Research and Development
SME	Small and Medium Enterprises
USD	United States Dollar
WB	World Bank
WFP	World Food Program
WII	Weather Index Insurance
WMO	World Meteorological Organization
WRSI	Water Requirement Satisfaction Index

EXECUTIVE SUMMARY

This study explores the feasibility of weather index insurance (WII) in providing cost-effective risk management benefits to rural people for coping with catastrophic events. The case study analyzed relates to drought coverage for maize production risk in Eastern Indonesia.

Indonesia is considered one of the more vulnerable countries to hydro-meteorological risks in Asia. In some agricultural areas, harvest and production dip significantly during ENSO (El Niño Southern Oscillation) events due to below-normal rainfall. Indonesian production is highly dependent upon rainfall. Only 17 percent of the country's cultivated area has access to irrigation infrastructure, and only 10 percent of this land is effectively irrigated. More than 80 percent of the agricultural activity depends on rainfall for irrigation. Out of a population of 235 million, 57 percent earn their living from the agricultural sector and 90 percent of them are farmers who are susceptible to weather risks.

In a previous project, IFC Indonesia Advisory Services facilitated maize farmers to obtain loans from commercial banks using a tripartite lending approach. One of the important lessons learned through that project was that weather was a major factor conditioning the availability of loans. Drought was a problem cited by lenders and farmers alike. IFC tried to find ways to ameliorate this risk, consulted with several insurance companies, but found no company willing or able to offer reasonably priced coverage against weather risk. After learning of the encouraging work done in other countries that were pioneering the use of index-related insurance, IFC decided to assess the possibility of developing drought index insurance for maize production in Indonesia, with support from the Smallholder Agribusiness Development Initiative.

The Feasibility Study was conducted during an interesting time both globally and for Indonesia. In recent years, the advent of climate change and food price crises has contributed to the sense of urgency for countries about the need to improve risk management for agriculture. The same concerns resonate within Indonesia and the study benefited greatly from a positive momentum fostered by key Indonesian stakeholders who are motivated to identify innovative and sustainable risk management solutions. In fact, the Ministry of Agriculture (MoA) is currently implementing an agricultural insurance pilot program in West and Central Java that offers a multi-peril crop insurance (MPCI) product for rice and a livestock insurance product covering death and theft for cattle.

The essential principle of index insurance is that contracts are written against specific perils or events (e.g., area yield loss, drought, hurricane, flood) which are defined and recorded at aggregate levels (e.g. at a local weather station in a district). The index serves as a proxy for the total losses in an aggregated area such as a district rather than being a measure of the individual losses of each policyholder. The index should be defined against events that are highly correlated (on the downside) with regional agricultural production or against the loss of key productive assets.

All buyers in the same region are offered the same contract terms per dollar of insurance coverage. That is, they pay the same premium rate and, once an event has triggered a payment, receive the same rate of payment. Their total payments and indemnities would be that rate multiplied by the total value of the insurance coverage purchased.

Since all buyers of the same index contract pay the same premium and receive the same indemnity per unit of insurance regardless of their actions, index insurance avoids the problems of adverse selection and moral hazard. Index insurance can also be relatively cheap to administer, since there are no on-site inspections or individual loss assessments to perform. It only uses data on a district index, and this can be based on data that are available and generally reliable. It is also relatively easier to market.

In order test the technical feasibility of insurance indexed to weather, or weather index insurance for Indonesia, it is necessary to verify the existence of specific prerequisites. The Feasibility Study team assessed the existence of necessary data and the adequacy of weather measurement infrastructure.

The quality of weather data managed by the National Weather Service of Indonesia (BMKG) is high and the length of the time series of most stations is adequate for WII applications. BMKG is very supportive regarding the potential development of weather index insurance programs and agreed to provide weather data for this Feasibility Study. They are also prepared to make available historical and real time data for commercial insurance programs.

Agricultural production data, mainly historical yield data, is available but, as has been encountered in other countries, the data is not sufficiently disaggregated to support WII. In order to determine, therefore, the historical impact of drought on maize production, a crop modeling approach based on the FAO Water Requirement Satisfaction Index was adopted.

In order to assess the technical feasibility of WII for Indonesia, three case study areas were selected based upon certain criteria. In order to be appropriate grounds for a field assessment, the areas selected had to be:

a) Representative of a relevant maize production environment;
b) Covered by a suitable weather station with an acceptable history of weather data collection;
c) Significant in terms of IFC's development objectives, in this case a poor area in Eastern Indonesia.

Areas in the provinces of East Java, Nusa Tenggara Barat (NTB) and East Lombok were selected.

In each area specific focus group discussions (FGDs) with maize farmers were carried out and meetings were held with all other relevant stakeholders, including local government representatives, national weather service staff, and bankers. The in-field assessments, in addition to analyses of historical weather data, provided sufficient evidence to develop prototype WII contracts for two areas located in the Tompobulu sub-district, Maros district of South Sulawesi province, and in the Pringgabaya sub-district, East Lombok district of NTB province.

The prototype contract design activity showed that rainfall index contracts that address drought risk in maize cultivation in the selected areas provide appropriate coverage for crop losses resulting from rainfall deficit. Hence, for the cases explored, index insurance can be considered "technically feasible". With regards to the economic feasibility, the estimated "pure risk premiums" seem close to the upper boundaries of what could be considered acceptable to farmers. In other words, the premiums would be expensive, but perhaps not prohibitively so. Any final determination of actual suitability of the contracts must be left to the end-user; farmers must decide that it is worth the money to buy insurance coverage if it provides significant protection from a relevant risk, or if it grants access to sources of funding that might otherwise be inaccessible. In the final analysis, the actual economic or commercial feasibility of a WII product can only be proven through a pilot test wherein people actually buy WII products.

One important caveat highlighted by the Feasibility Study is that any WII contract design in Indonesia should take due consideration of the linkages between the event insured and the ENSO patterns.

The Feasibility Study showed that the more promising approach to marketing WII products would be through an intermediary, such as a credit institution, like a bank, MFI, or cooperative. In fact, farmers in many cases do finance productive activities through informal credit, often paying exorbitant interest rate (as high as 50 percent over a period of 4 months). Smallholders do not approach local financial institutions for credit because formal lenders generally require land title as collateral, which most do not possess. In the interviews and discussions carried out in support of the Feasibility Study, farmers indicated that they would be ready to pay an insurance premium of over 10 percent if this helped them to access formal credit providers that charge an annual interest rate of 15 percent.

In order to assess the potential interest of relevant stakeholders for the implementation of WII in Indonesia, the Feasibility Study team offered dedicated seminars for both the insurance and credit industries and interviewed officials of the insurance supervisory body of Indonesia (Insurance Bureau, Ministry of Finance).

The following are the key conclusions of the Feasibility Study:

1. **The Feasibility Study demonstrated that it is feasible to develop weather index insurance for Indonesia. A technical contract design is feasible, and there is a readily identifiable business model to support WII for maize production in the study areas.** Insurance can be particularly instrumental in unlocking credit for maize farmers if developed through a partnership between the insurance and agricultural banking sectors. In the cases examined, an initial estimation suggests that coupling weather index insurance with credit from formal financial institutions could reduce the cost of borrowing for farmers.

2. **Though promising, WII is not a panacea for all the existing problems farmers face in the areas observed.** While having access to insurance would mitigate weather risk and likely alleviate the concern of some banks about the risk of lending to farmers, other underlying inefficiencies in maize production and financing still remain, e.g., poor extension services, inadequate storage facilities, bad roads, persistent preference of banks for land as collateral. These inefficiencies are not addressed by WII. Promotion of WII could improve the situation of Indonesia's farmers, if complemented by effective measures to deal with these other chronic problems.

3. **Any final determination about whether WII products can be sold on a commercial basis to farmers can be made only after substantial test marketing of these products demonstrates their attractiveness.** Technical feasibility is identified as the possibility of structuring a suitable WII contract while commercial feasibility is focused on determining if the product developed in the technical phase can be sold in such volumes that it makes commercial sense. In other words, can WII products be marketed successfully to farmers on a scale that allows the product provider to develop a sustainable line of business? To reach definitive conclusion about commercial feasibility of a WII product, it is necessary to go through a properly structured pilot test in which actual transactions between the parties involved (insurers, reinsurers, banks, and end-users) take place.

4. **Marketing of index insurance contracts requires the participation of willing and motivated insurance companies and/or financial institutions.** Though the seminars held with key players in the insurance and financial industries indicated general interest, no clear champion has demonstrated the level of strong motivation and interest necessary to carry the concept into commercial implementation. International experience in the promotion of index insurance suggests that successful program development needs a strong driving force usually from the insurance industry, but also from other key players such as agricultural banks and agribusiness companies.

5. **WII may offer a promising approach to insuring maize production in Indonesia, but the instrument is likely to apply only to specific crops in specific areas. WII should not be considered a universal solution for lowering the risk of agricultural production across the whole country**. While Indonesia is extremely diverse in topography, crop production systems and patterns of weather risk, index insurance is most promising for slow-onset hazards (such as drought), and for annual rain-fed, field-scale crops (e.g. cereals, oilseeds, fiber crops) whereby the impact of the hazard is the loss of yield rather than quality. In addition, the range of index products available for agriculture in general is still relatively limited. The majority of weather index insurance products to date have been designed for rainfall risk; deficit or excessive rainfall, however, are not the only weather risks in Indonesia. In some regions, farm losses often result from a complex interaction of perils which also make weather index insurance less suitable, or have to be supplemented by other risk management measures. Given the nature of this insurance product, the key to successful program development therefore rests on the identification of suitable crops and production areas where a predominant weather risk can be identified and is suitable to the index approach.

INTRODUCTION

This study explores the feasibility of weather index insurance (WII) in providing cost-effective ways for rural dwellers to manage risk and better cope with catastrophic events. The case study analyzed is drought coverage for maize production risk in Eastern Indonesia.

Indonesia is considered one of the more vulnerable countries to hydro-meteorological risks in Asia. In some agricultural areas, harvest and production dip significantly during ENSO (El Niño Southern Oscillation) events due to below-normal rainfall. Indonesian production is highly dependent upon rainfall. Only 17 percent of the country's cultivated area has access to irrigation infrastructure, and only 10 percent of this land is effectively irrigated. More than 80 percent of agricultural activity depends on rainfall for irrigation. Out of a population of 235 million, 57 percent earn their living from the agricultural sector and 90 percent of them are farmers who are susceptible to weather risks.

In a previous project,[1] IFC Indonesia Advisory Services helped maize farmers to obtain loans from commercial banks using a tripartite lending approach. One of the important lessons learned from that project was that weather risk was a major factor in loan provision and acceptance. Drought was a problem cited by farmers and lenders alike. IFC tried to find ways to ameliorate this risk, consulted with several insurance companies, but found no company willing or able to offer reasonably priced coverage against weather risk. After learning of the encouraging work done in other countries that were pioneering the use of index-related insurance, IFC decided to assess the possibility of developing drought index insurance for maize production in Indonesia, with support from the Smallholder Agribusiness Development Initiative.

Eastern Indonesia is an area of particular interest to IFC, primarily for the development challenges that are faced by people living in that region. Lack of access to finance is more acute, particularly for the rural population. There is also a greater incidence of poverty and more reliance on income from agricultural activity than on Java and Bali. In considering new risk management tools and products that are suited to rural dwellers engaged in agriculture, IFC is especially keen to identify opportunities to carry out activities in Eastern Indonesia.

In assessing the feasibility of rainfall index insurance for maize production, this report will: (a) explain the principles of weather index insurance; (b) highlight weather data requirements for implementing WII, and describe the meteorological infrastructure of Indonesia; (c) analyze the production environment for maize in Indonesia; (d) illustrate the process of developing rainfall index insurance contract prototypes in selected locations; (e) present potential business models for the implementation of WII, and outline the interest of key stakeholders in participating in the development of a WII market; and (f) indicate the compatibility or compliance of WII products with existing Indonesian insurance regulation.

It may useful to underline that this Feasibility Study will focus primarily on assessing the "technical feasibility" of WII for maize production in Eastern Indonesia. In this context, "technical feasibility" is identified as the possibility of structuring suitable WII contracts. Generally speaking, the feasibility of index insurance also has an economic or commercial facet, in other words, if the product developed in the technical phase makes economic sense and can be commercially marketed. To reach a definitive conclusion on the commercial viability of a WII product it would be necessary to go through a properly structured pilot test in which the actual parties transact insurance (insurers, reinsurers, banks, and end-users). This Feasibility Study will be limit to the analysis of technical feasibility of WII for maize production in Eastern Indonesia, with the objective of providing the stakeholders with the necessary information to decide whether a pilot market testing to determine the economic or commercial feasibility should be pursued.

1 Maize & Poultry, Project ID 523084.

CHAPTER ONE

WEATHER INDEX INSURANCE

1.1 Principles of index insurance[2]

The essential principle of index insurance is that contracts are written against specific perils or events (e.g., area yield loss, drought, hurricane, flood) which are defined and recorded at aggregate levels (e.g. at a local weather station in a district). The index serves as a proxy for the total losses within that district rather than measuring the individual losses of each policyholder. The index should be defined against events that are highly correlated (on the downside) with regional agricultural production or against the loss of key productive assets.

All buyers of an index contract or policy in the same region are offered the same contract terms per unit of insurance coverage. That is, they pay the same premium rate and, once an event has triggered a payment, receive the same rate of payment. Their total payments and indemnities would be that rate multiplied by the total value of the insurance coverage purchased. Payouts for weather index insurance can be structured in a variety of ways, ranging from a simple zero/one contract (once the threshold is crossed, the payment rate is 100 percent), through a layered payment schedule (e.g., a one third payment rate as different thresholds are crossed), to a proportional payment schedule.

Since all buyers of the same index contract pay the same premium and receive the same indemnity per unit of insurance regardless of their actions, index insurance avoids adverse selection and moral hazard problems. A farmer with rainfall insurance possesses the same economic incentives to manage his or her crop as an uninsured farmer, and an insured lender has the same incentive to collect loans as an uninsured lender.

Index insurance can also be relatively cheap to administer, since there are no on-site inspections or individual loss assessments to perform. It only uses data on a district index, and this can be based on data that are available and generally reliable. It is also relatively easier to market.

The two main classes of index insurance applied in agriculture are area-yield and weather index insurance (WII). This Feasibility Study focuses on WII and, in particular, on rainfall-index insurance. Box 1 provides a summary of the typical features of this type of index insurance contracts.

2 This section is adapted from IFAD – WFP, 2010.

Box 1: Main features of rainfall-index contracts for agricultural risk management

- Rainfall Index insurance contracts are based on rainfall indices structured to reflect variability of crop productivity, and focus on adverse deficits or excessive rainfall which cause lower crop yields;

- The indexes underlying the insurance contract are computed on the basis of rainfall data collected from a weather station that is representative of the climatic characteristics of the area in which crop production is carried out;

- Potential purchasers of insurance contracts must be restricted to the area covered by the reference weather station;

- Different contracts must be designed for areas characterized by different climatic conditions (i.e., different seasonal rainfall patterns);

- The coverage period of a rainfall index insurance contract usually spans one complete crop cycle, starting at the time of sowing and ending at the time of harvest;

- The only perils covered by rainfall index contracts are lack or excess of rainfall. Any other source of crop loss is not covered by the index policy;

- As index insurance policies are settled on the basis of rainfall measurement, there is no requirement of field-based loss adjustment. Payouts can be provided in a timely manner as soon as the index data is available. In a given area, all parties insured under a specific contract pay the same premium to purchase the coverage and receive the same payout if a paying event is triggered;

- The total amount insured by the contract is negotiated between the interested parties, but it is usually set at a level equal to the difference between input costs and potential crop revenue under normal conditions.

Box 2: Advantages and Disadvantages of Index Insurance

ADVANTAGES

Less moral hazard
The indemnity does not depend on the individual producer's realized yield.

Less adverse selection
The indemnity is based on widely available information, so there are few informational asymmetries to be exploited.

Lower administrative costs
Does not require underwriting and inspections of individual farms.

Standardized and transparent structure
Uniform structure of contracts.

Availability and negotiability
Standardized and transparent, could be traded in Secondary markets.

Reinsurance function
Index insurance can be used to more easily transfer the risk of widespread correlated agricultural production losses.

Versatility
Can be easily bundled with other financial services, facilitating management of basis risk.

CHALLENGES

Basis risk
Without sufficient correlation between the index and actual losses, index insurance is not an effective risk management tool. This is mitigated by self-insurance of smaller basis risk by the farmer, supplemental products underwritten by private insurers, blending index insurance and rural finance, and offering coverage only for extreme events.

Precise actuarial modeling
Insurers must understand the statistical properties of the underlying index.

Education
Required by users to assess whether index insurance will provide effective risk management.

Market size
The market is still in its infancy in developing countries and start-up costs can be significant.

Weather cycles
Actuarial soundness of the premium could be undermined by weather cycles that change the probability of the insured events, for example, El Niño events.

Micro climates
Render rainfall or area-yield index based contracts difficult for more frequent and localized events.

Forecasts
Asymmetric information about the likelihood of an event in the near future will create the potential for inter-temporal adverse selection.

Source: World Bank, 2005.

1.2 The appropriate role of weather index insurance

WII has greater potential to help lower weather risks in an agricultural system where financing, production, processing and marketing are well functioning and integrated. Insurance can be a suitable risk management option, but it cannot solve problems related to agricultural production inefficiencies. In most cases, having insurance means little to farmers if they still do not have financing or cannot get crops to markets. To represent the best value proposition, insurance should therefore be grafted onto a system where other vital economic parts are already functioning reasonably well, but where the insurance improves efficiency or further unlocks the economic potential in agricultural production.

Ideally, index insurance should be integrated into coordinated supply chain relationships with linkages between input provision, commodity sales, and additional flows of resources, extension services, technical advice and production oversight. Contract farming is an example of this kind of arrangement. At the very least, insurance should be complemented with a broader offering of products and services.[3] A key linkage that should be particularly emphasized is with agricultural finance. Without bundling insurance with credit, many farmers will lack both the capital to pay the insurance premium and sufficient incentive to use scarce resources to buy risk coverage. Placing insurance products within complementary systems with broader linkages can also facilitate simpler contract design, as other mechanisms can deal more efficiently with the subtle aspects of risk and crop losses that cannot be indexed. In some cases, the package of instruments which is eventually adopted in Indonesia may have to include other insurance products (such as named peril insurance) to deal with remaining ancillary risks.

1.3 Where weather index insurance is inappropriate[4]

Index insurance contracts will not work equally well for all agricultural producers. First, many agricultural commodities are grown in micro-climates. Coffee grows on certain mountainsides in various continents and countries, for example, and fruits such as apples and cherries also commonly grow in areas with very large differences in weather patterns within only a few miles. In highly spatially heterogeneous production areas, basis risk will likely be so high as to make index insurance problematic. Under these conditions, index insurance will work only if it is highly localized and/or can be written to protect against only the most extreme loss events. Even in these cases, it may be critical to link index insurance to lending, since loans are one method of mitigating basis risk. Secondly, it may be difficult to develop an index which correlates well with yield loss, for example if other causes of loss are important.

1.4 Relevant international experience[5]

There is growing international interest in WII, but so far it has only moved from pilot scale to commercial implementation in India and Mexico. Many countries, like Malawi, Thailand, China, Mongolia, Nicaragua, Honduras, Peru, Ghana, Tanzania, Kenya, Ethiopia, and Nepal are developing or testing this product in pilot programs for agriculture. There is a diversity of structures from micro (farmer level) to macro (regional and national level) indices. Index insurance at an aggregated level is used in Mexico to insure state governments' emergency response to farmers in drought years. Livestock mortality index insurance has been introduced in Mongolia.

3 Such as advisory services on crop and natural resource management practices; investments in improved on-farm and community crop storage facilities; research on improved drought resistant seeds; measures for improved seed selection and storage; etc.

4 *World Bank, 2005.*

5 For more information on WII implementation experiences and case studies see IFAD-WFP, 2010.

CHAPTER TWO

WEATHER DATA AND CLIMATE PATTERNS

2.1 Weather Data Requirements for WII

The data used to compute the weather indices underlying the WII contracts must adhere to strict quality requirements. Such data must:

1. Originate from reliable and trustworthy on-going daily collection and reporting procedures;
2. Go through daily quality control and cleaning;
3. Be verified by a trusted and independent third party operator.

Ideally, weather contracts are based on data collected by official national meteorological services from automatic weather stations. Moreover, the weather station on which a index insurance contract will be based must fulfill some minimum security requirements, to ensure that no party in the contract has the ability to alter the data collection and dissemination. Such security requirements are particularly important if insurer and insured agree to base their contract on non-official weather stations. In this case, a further agreement is needed as to what is the transparent procedure for collecting and processing the data.

The acceptable maximum distance between the reference weather station and the farm to be insured is generally considered to be 20 km. It is good practice, however, to determine the actual boundaries of the area covered by a specific contract on a case-by-case basis.

In order to secure the collection of data required to compute the index, a fallback procedure may be required in order to provide alternative options in the event of missing data from the primary reference weather station. To this end, often a nearby weather station is identified from which data can be collected, or a nearby set of weather stations are identified from which observations can be interpolated to the position of the primary station.

The following list can be considered a general reference for weather data requirements for WII applications:[6]

- At least 20 years of historic weather data
- Limited missing values and out-of-range values (preferably less than 1 percent missing observations)
- Data integrity
- Availability of a nearby station for fall-back verification purposes
- Consistency of observation techniques: manual versus automated
- Limited changes of instrumentation / orientation / configuration
- Integrity of recording procedure
- Little potential for measurement tampering

2.2 Weather Data Infrastructure in Indonesia

The agency responsible for collecting and storing weather data in Indonesia is the *Badan Meteorologi Klimatologi dan Geofisika* (BMKG).

BMKG manages 120 manned meteorological stations, 83 automatic weather stations (AWS), 55 automatic rain gauges (ARG) and 4500 manual rain gauges (MRG) across Indonesian territory. Sixty of the stations managed by BMKG are

6 Adapted from Ismea, 2006.

part of the World Meteorological Organization (WMO) network.

In its main climate observation stations, BMKG also operates 17 lysimeters, which are special devices for measuring "actual evapo-transpiration" of a specific plant-soil system.

The data collected by the automatic equipment (83 AWS and 55 ARG) are transmitted by GPRS connection to BMKG headquarters.

Other institutions, such as the Ministry of Agriculture, the Ministry of Public Works, local government offices and other research centers, also manage weather stations. These stations are mostly manual rain gauges. BMKG receives and stores the data collected by other weather data collection networks.

The quality of weather data managed by BMKG is very high and the length of the time series of most stations is adequate for WII applications.

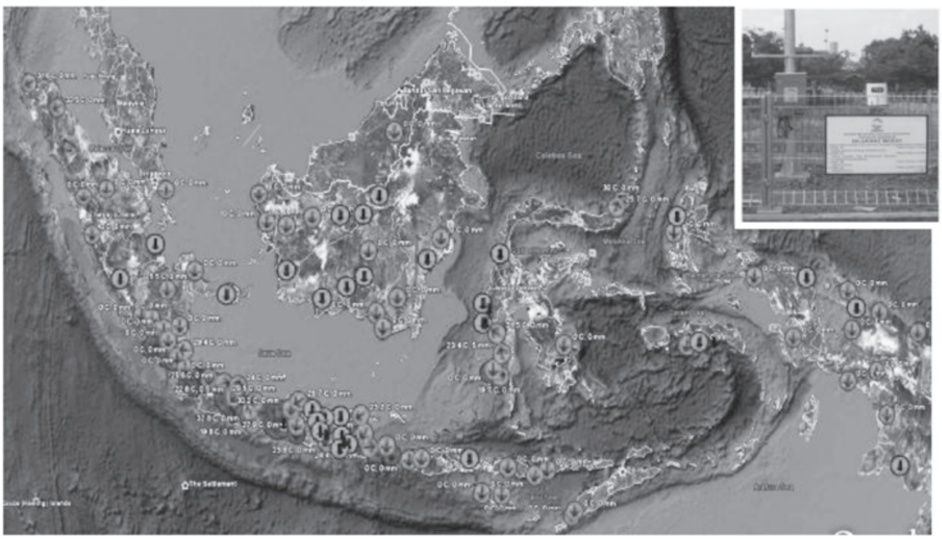
BMKG is very supportive of a potential development of weather index insurance programs.

BMKG management agreed to provide weather data for this Feasibility Study and would be prepared to make available historical and real time data for commercial insurance programs.

Setting up periodical (every one – two weeks) data transfer to the parties involved in WII transactions is also technically possible.

Should international donors or private entities support the purchase and installation of automatic weather stations to replace manual rain gauges, BMKG would be prepared to maintain them, under specific MoUs.

Figure 1: Network of Automatic Weather Stations managed by BMKG



2.3 Relevance of El Niño Southern Oscillation in WII contract design for Indonesia

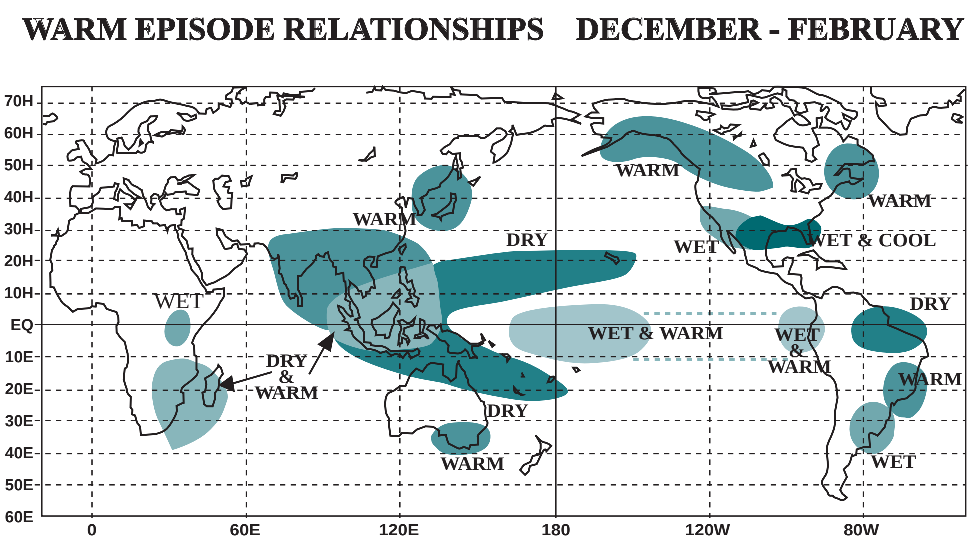
El Niño-Southern Oscillation (ENSO) is a pattern of climate variability that originates from ocean-atmosphere interactions in the tropical Pacific and affects the weather at planetary scale.

Human activities, from agriculture to fishing, as well as constructions and infrastructures, are exposed to the consequences of ENSO: droughts, floods, changes in ocean currents and other environmental risks.

ENSO is composed of two main phases: warm episodes (El Niño) characterized by warmer than average sea surface temperatures in the tropical pacific and dry condition in the west Pacific, including Indonesia; cold episodes (La Niña) characterized by cooler than average temperatures in the tropical Pacific and wet conditions in the west Pacific warm pool (Figure 2).

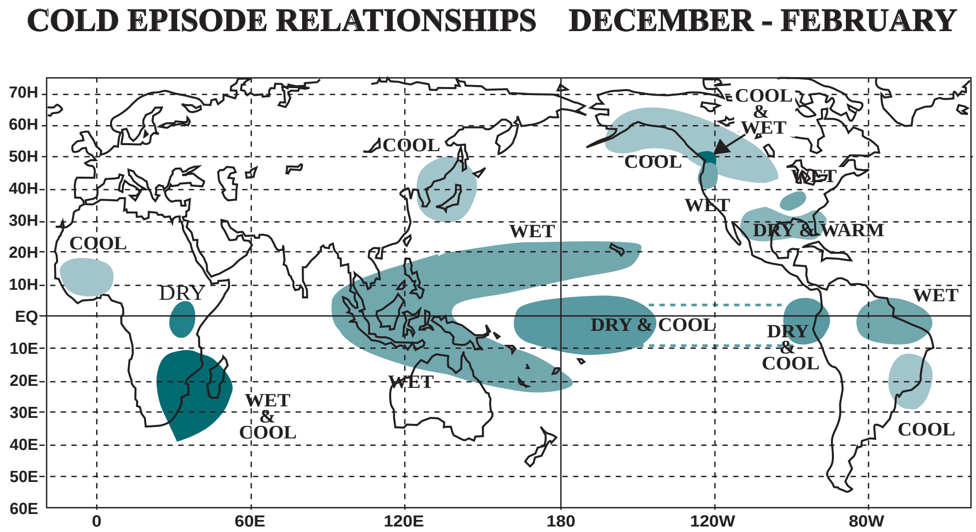
ENSO is a "quasi-periodic" phenomenon because its duration spans the entire range between 3 and 7 years. In spite of being so irregular, the physical mechanism underlying ENSO is rather simple.[7] As a consequence, El- Niño is a pattern of climate variability on which some degree of predictability and significant forecasting skills exist at the seasonal time scale.[8] A few indicators are commonly adopted to monitor and to predict the state of ENSO, including the average sea surface temperature over selected areas of the tropical Pacific and the anomaly of sea level pressure difference between Darwin (Australia) and Thaiti.
An example of the direct consequences of ENSO in the pilot area selected for this study is provided by considering the correlation (0.60) between the Niño3 index during December-February (see note in Figure 2 for more details) and the annual rainfall in Pringgabaya.
The predictability of an event is an issue in risk management, leading to either sub-optimal adapting strategies and/or asymmetric informed choices. Hence, any WII contract design activity in Indonesia should take the linkages between the event insured and ENSO patterns in due consideration.

Figure 2. Regional impacts of warm and cold phases of ENSO



(a)

7 The International Research Institute for Climate and Society (IRI) provides a simple description of the mechanisms that drive ENSO (http://iri.columbia.edu/climate/ENSO/background/basics.html)
8 Several centers provide seasonal ENSO forecasts routinely. A comprehensive summary is provided by IRI (http://iri.columbia.edu/climate/ENSO/currentinfo/SST_table.html)



(b)

Source: NCEP-Climate Prediction Center, http://www.cpc.ncep.noaa.gov/

***NOTE**: The shaded areas mark the main regional impacts of ENSO. The dashed lines in the eastern tropical Pacific indicate the area of the surface ocean adopted for the definition of the Niño3 index, a common indicator of ENSO activity based on sea surface temperature. (a) Regional impacts during El Niño events, characterized by a warm ocean surface in the Niño3 area; (b) regional impacts during La Niña events, with Cool Ocean surface in the Niño3 area.*

CHAPTER THREE

MAIZE PRODUCTION IN INDONESIA

In 2008 the agricultural sector has contributed IDR 713,291 billion to the Indonesian economy (Table 1). Nearly half of this production value comes from food crops (Figure 3) of which maize accounts for 12% with IDR 40,608 billions.

Maize production in Indonesia is progressively growing, increasing 25% in terms of area planted and 56% in aggregate production between 2003 and 2009, implying a growth in average productivity of 25% between these years (Table 2).

Indonesia is a net importer of maize with minimal exports flows (Figure 4). Maize imports fluctuate according to the needs of the internal market and in 2006 reached a level of 16% of domestic production.

Given the importance of maize in the rural economy, the crop is grown across the whole country. Java provinces account for over 50% of national maize production with Lampung, South Sulawesi, North Sumatra, East Nusa Tenggara, Gorontalo being other important production areas (Table 3).

In Indonesia maize is mainly used for animal feed although there are some alternative uses in the biochemical industry. The share of maize used for human consumption is approximately 10%.

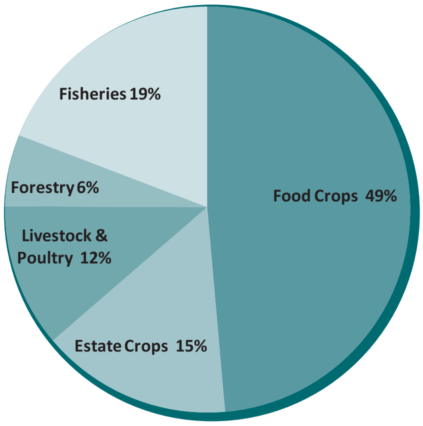
Table 1: Value of production of the agricultural sector 2003 – 2008 (Current IDR Billions)

Sector	2003	2004	2005	2006	2007	2008
Agricultural	241,757	255,824	281,969	328,822	408,012	536,863
- Sub Sector Food Crops (Tanaman Pangan)	157,649	165,558	181,332	214,346	265,091	347,842
- Sub Sector Estate Crops (Perkebunan)	46,754	49,631	56,434	63,401	81,596	106,186
- Livestock & Poultry (Peternakan & Perunggasan)	37,354	40,635	44,203	51,075	61,325	82,835
Forestry	18,415	20,290	20,290	30,066	35,884	39,992
Fisheries	45,612	53,011	53,011	74,335	97,697	136,436
Total	**305,784**	**329,125**	**355,270**	**433,223**	**541,593**	**713,291**
	4	**5**	**0**	**3**	**3**	**1**

Source: Indonesia Statistics & Information 2003-2008 - BPS 2009

***Note**: Food crops include rice, corn, soybean, ground nuts, mung bean, cassava, potatoes, etc. Estate crops include cocoa, palm oil, coffee, sugar cane, etc.*

Figure 3: Breakdown of value of production of the agricultural sector for 2008



Source: Indonesia Statistics & Information 2003-2008 - BPS 2009

Table 2: Maize Production in Indonesia

	2003	2004	2005	2006	2007	2008	2009 (forecast)	% Change 03-09
Area Planted (hectares)	3,358,511	3,356,914	3,625,987	3,345,805	3,630,324	4,001,724	4,194,143	25%
Total Production (tons)	10,886,442	11,225,243	12,523,894	11,609,463	13,287,527	16,317,251	17,041,215	57%
Average Yield (tons/ha)	3.24	3.34	3.45	3.47	3.66	4.08	4.06	25%

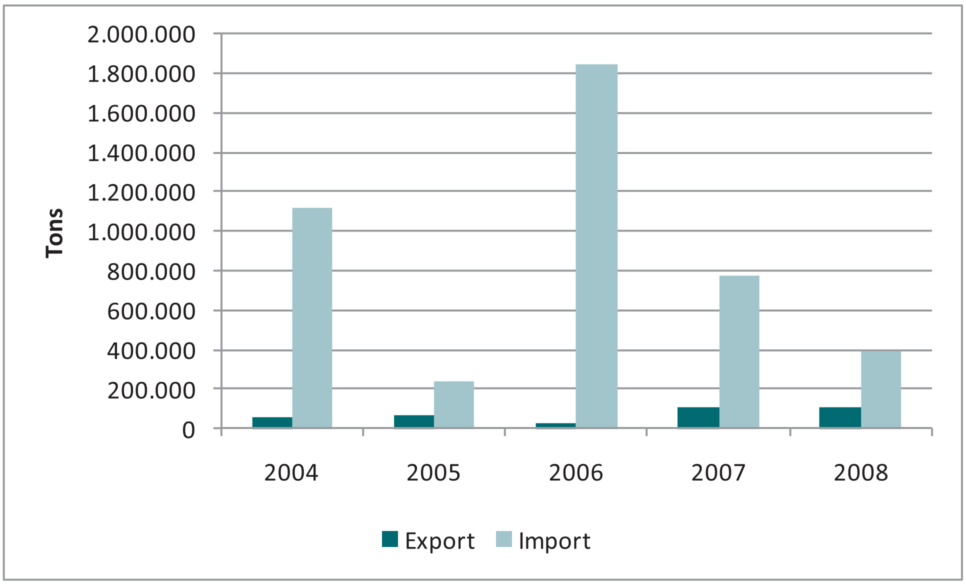
Source: Ministry of Agriculture, Food Crops Directorate General

Table 3: Share of National production in main production provinces

Province	2009	
	Production (ton)	Share
East Java	5,193,648	29.41%
Central Java	3,195,904	18.10%
Lampung	2,038,615	11.54%
South Sulawesi	1,359,707	7.70%
North Sumatera	1,169,024	6.62%
West Java	776,757	4.40%
East Nusa Tenggara	637,393	3.61%
Gorontalo	599,322	3.39%
National Maize Production	17,659,067	

Source: Ministry of Agriculture, Food Crops Directorate General

Figure 4: Import and Export of Maize in Indonesia



Source: Ministry of Agriculture, Ministry of Trade, and BPS 2009

CHAPTER FOUR

SELECTION OF CASE STUDY AREAS

4.1 Area selection

In order to assess the technical feasibility of WII, three case study areas were selected based upon certain criteria. In order to be appropriate for grounds for a field assessment, the areas selected had to be:

a) Representative of a relevant maize production environment;
b) Covered by a suitable weather station with an acceptable history of weather data collection;
c) Significant in terms of IFC's development objectives, in this case a poor area in Eastern Indonesia.

The screening process carried out by the Feasibility Study team led to the selection of areas in the provinces of East Java, Nusa Tenggara Barat (NTB) and East Lombok.

The selected areas were:

1) Solokuro subdistrict, Lamongan district, East Java province;
2) Tompobulu subdistrict, Maros district, South Sulawesi province;
3) Pringgabaya subdistrict, East Lombok district, NTB province.

The objective of the case study analysis was to determine the existence and the relevance of drought risk in maize production, and to collect all the information necessary to carry out the contract design activity.

In each area specific focus group discussions with maize farmers were carried out and meetings were held with all other relevant stakeholders, including local government representatives, national weather service personnel, and staff of financial institutions.[9]

The choice of the three areas proved to be appropriate as it provided three significantly diverse environments with maize drought risk. In two of the areas, Lamongan and Maros, farmers follow the traditional double cropping season (October to February and March to July) while in East Lombok the climate pattern allows harvesting of only one maize crop between November and March. With respect to drought risk, only two of the three areas suffer from drought problems (Maros and East Lombok) while in Lamongan rain conditions have always been favorable for maize production and drought has never been experienced. As a consequence, the field work indicated that it would not be meaningful to design a drought index contract for maize producers in Lamongan, where there is very little drought risk, if any.
Following the evidence provided by the field work, contracts have been designed only for Maros and East Lombok. The following paragraphs summarize the main findings of the field visits in these areas.

4.2 Maize production and farmers' interest in WII: Maros

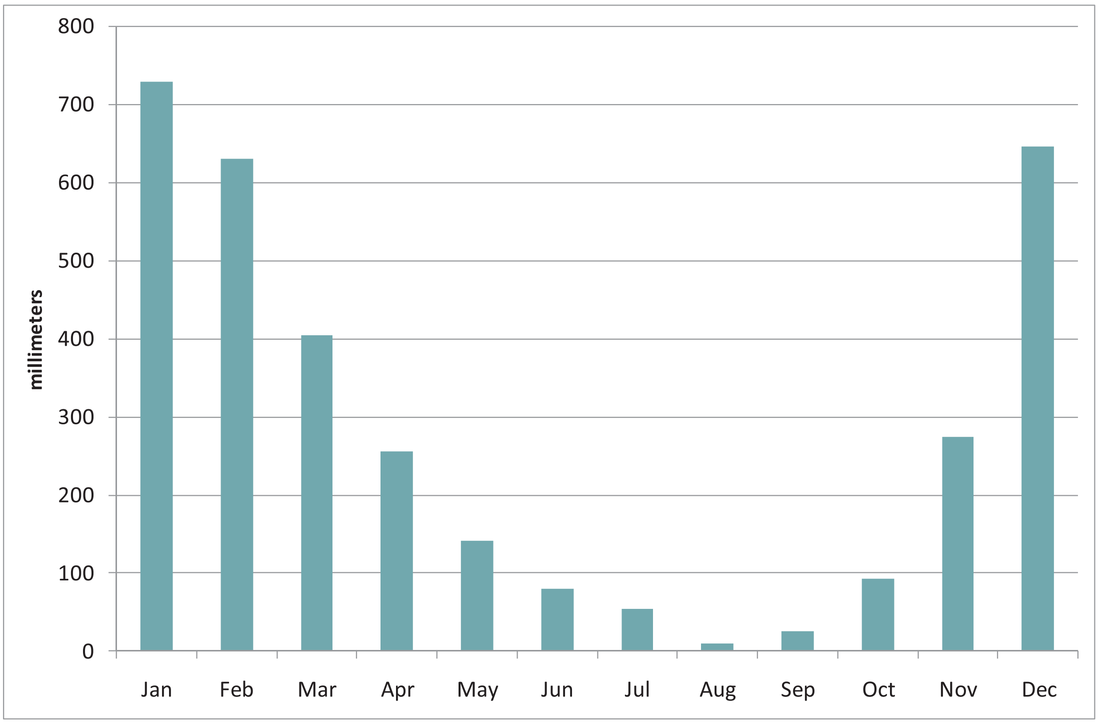
In the Maros area maize is cultivated in two crop cycles:

- the first cycle is from October-November to February–March;
- the second cycle is from March-May to June-August.

9 A sample questionnaire administered during farmers' focus group discussions is presented in Annex 2.

The first crop cycle is the most reliable and profitable one as it is carried out in the rainy season (Figure 5) and yields are generally good. During this portion of the crop year, farmers may sometimes cultivate rice instead of maize.

Figure 5: Average monthly precipitation from 1977 to 2007 for the Maros Weather Station



Source: BMKG

On non-irrigated land, the second cycle is at greater risk since it straddles the drier season, during which time lack of rainfall may cause yields to drop--or even total crop failure. Therefore a potential rainfall index insurance scheme may be considered useful for maize cultivation in the second crop cycle.

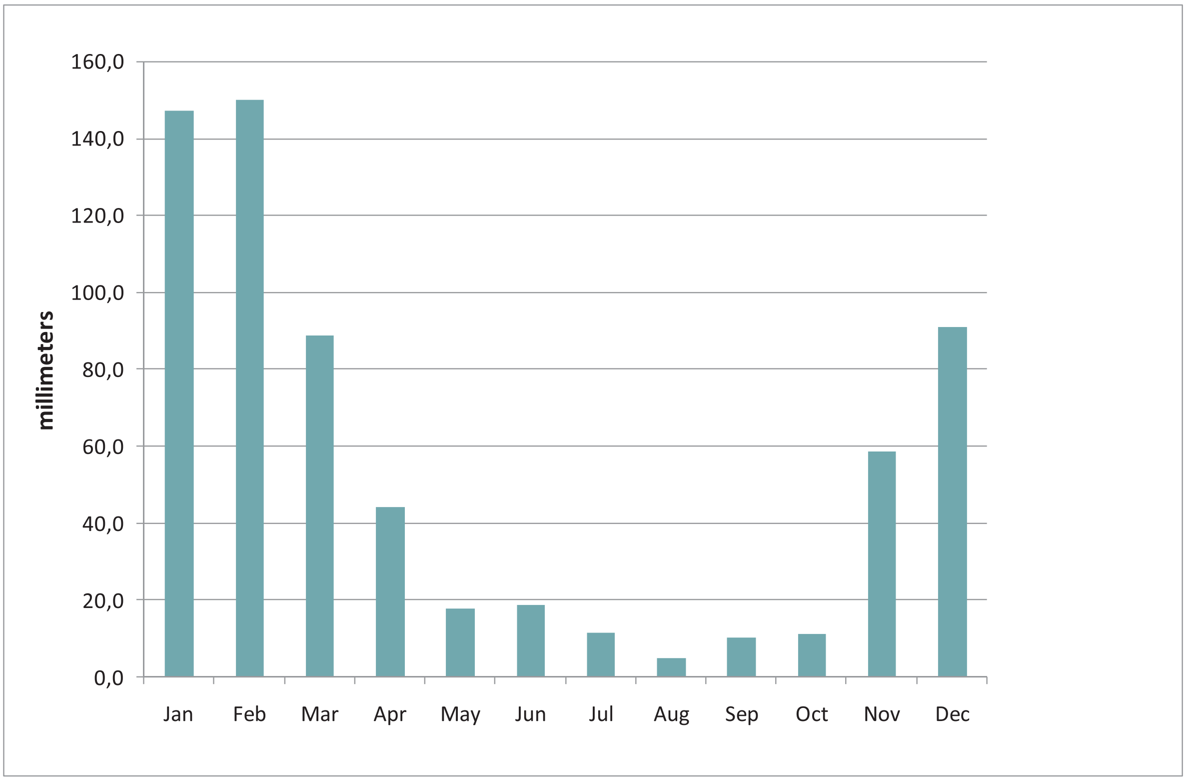
In the Maros area farmers indicated that an insurance policy that provides an indemnity in case of drought could improve their ability to access credit useful for purchasing inputs. In the Maros area credit is provided by state-owned Bank Rakyat Indonesia (BRI), which administers a credit subsidy program that reduces the 16 percent annual commercial interest rate to a rate of 0.8 – 1 percent. These subsidized loans are provided only against collateral—meaning land—and not many farmers have clearly defined property rights on the land they farm.

4.3 Maize production and farmers' interest for WII in East Lombok

In the East Lombok district the Feasibility Study team visited two villages with quite different characteristics: Perigi in the Pringabaya sub-district; and Wanasaba in the Wanasaba sub-district.

In both villages maize cultivation is carried out in the rainy season (Figure 6) between November and March, when local producers can generally count on natural precipitation to water their maize crops cultivated on non-irrigated land.

Figure 6: Average monthly precipitation from 1978 to 2007 for the Pringgabaya Weather Station



Source: BMKG

Although the two villages seem to have slightly different micro-climates, with Perigi being more exposed to the consequences of erratic precipitation, the major difference appeared to be the asset endowment of their respective farmers and, consequently, in the financial exposure of producers in case of crop failure.

In Wanasaba, farmers are more affluent and are able to raise cattle that they use as a savings device and, consequently, as a source of liquidity in case of need. They usually do not approach local financial institutions for credit as they do not find it necessary.

In Perigi, farmers are active only in crop production and are cash-constrained. Perigi farmers finance their production activities through informal credit, paying an interest rate of 50% for 4-month loans. They do not approach local financial institutions for credit because they are not eligible—again, they do not possess land titles to offer as collateral.

In both villages FGDs about the features and benefits of rainfall index insurance were carried out. While Wanasaba farmers did not find the concept relevant, Perigi farmers clearly stated that they would be ready to pay an insurance premium of over 10 percent if this enabled them to access the formal credit channels that charge an annual interest rate of 15 percent. Bank Rakyat Indonesia (BRI) was mentioned as a preferred institution. The situation of Perigi's farmers seems to represent a common condition for farmers in the area.

CHAPTER FIVE

CONTRACT PROTOTYPES

5.1 Introduction

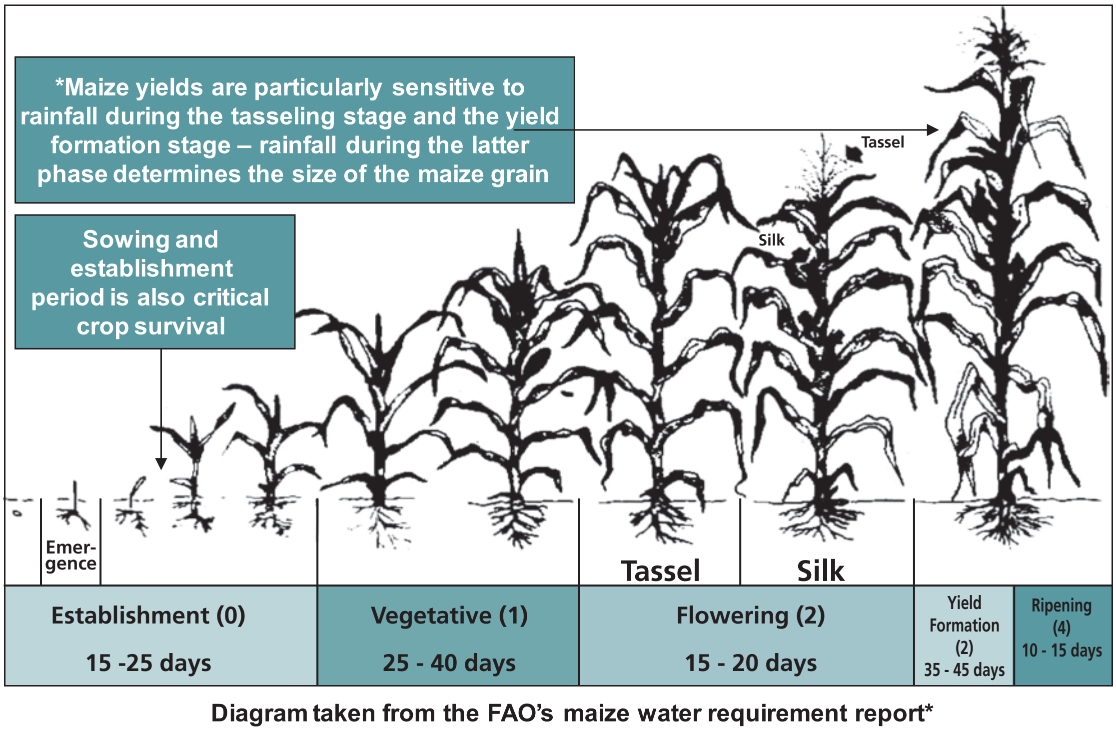
The objective of WII contract design is to define a structure that effectively captures the relationship between the weather variable and the potential crop loss. This chapter shows that for maize cultivation in Eastern Indonesia this is technically possible.

In particular, the analysis carried out for this Feasibility Study indicates that the standard contract structure for drought coverage, as developed on the basis of the international experience to date, is suitable for the Eastern Indonesia case studies examined.

5.2 Contract Phases and Payouts

The Maros and Pringgabaya rainfall index insurance contracts presented hereunder are structured on the basis of the "phase contract" approach applied in drought index insurance. In this approach the insurance contract is fractioned into various phases in order to account for the different tolerance of the crop to water stress during different crop phases.

Figure 7. Classification of maize crop phases according to rainfall impact



Source: FAO

Contract phasing takes into considering the varying importance of water availability at different stages in the crop cycle. In addition, dividing the contract into multiple phases allows a reduction in "basis risk", i.e. the difference between the payout as measured by the index, and the actual loss incurred by a farmer. A single phase contract considers the cumulative amount of rainfall over the entire crop cycle. Conspicuous precipitation events during one particular phase of the crop calendar, however, could generate sufficient rainfall to meet the minimum contract threshold, while the crop could still suffer from the effects of dry spells in other phases.

In the "phase model" each of the contract phases provides an independent payout according to the realization of the specific rainfall index developed for that particular phase. However, if more than one phase triggers a payout, the total payout for all phases cannot exceed the maximum payout stipulated in the contract.

The specific phase breakdown for the maize drought contract in Maros and Pringgabaya are as follows:[10]

- Phase 1: from planting to germination, 2 dekads;[11]
- Phase 2: vegetative phase, 3 dekads;
- Phase 3: from flowering to the beginning of yield formation, 4 dekads.

5.3 Dynamic start of coverage

Rainfall index contracts are usually designed to account for the fact that actual planting dates can vary.

When crops are grown in rain-fed regimes farmers usually start planting when the rain season has clearly set in. Empirical evidence shows that there is sufficient soil moisture for planting when a minimum of 25mm of rain falls within a ten-day period.[12]

When a contract is designed to accommodate for a dynamic starting date, all contract parameters and deadlines are determined according to the dekad in which the selected rainfall threshold is met.[13]

In this respect, the Maros and the Pringgabaya contracts are different. Given that in Maros the beginning of the maize crop that is exposed to drought occurs right around the middle of the rainy season, Maros area farmers don't need to wait for the rainy season to set in and tend to plant on the same date each year, namely, the 15th of March. In Pringgabaya this is not the case, and farmers wait for the onset of seasonal rains and therefore need a contract with a dynamic starting date provision.

5.4 Climatology of Maros and Pringgabaya

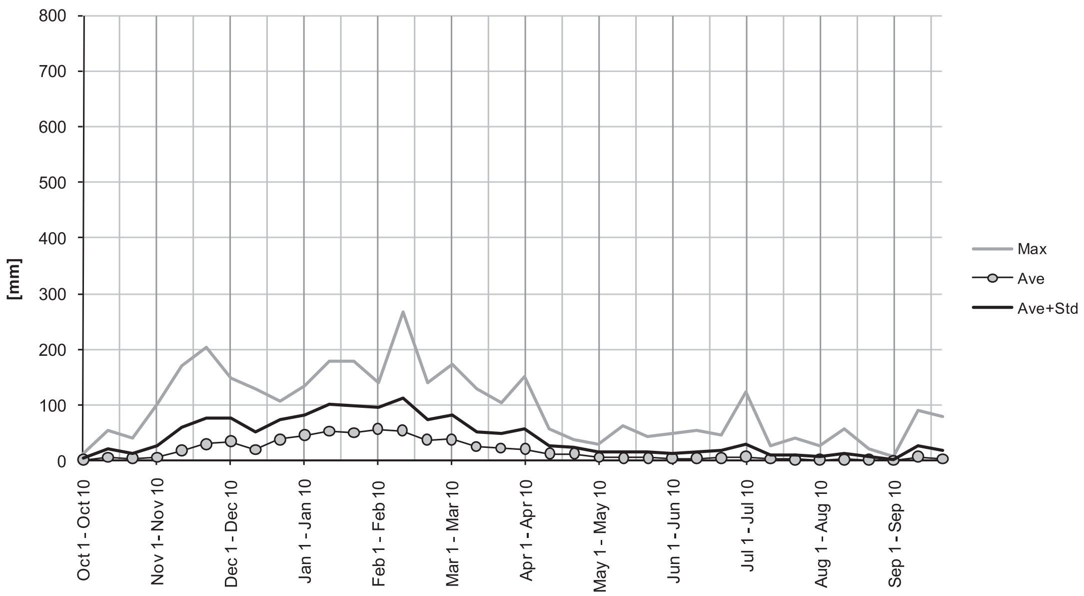
In designing a WII contract, the first thing to do is to identify the climatological characteristics of the area where the contracts will be offered. The ensuing analysis depends upon the specific weather perils identified, and assuming that rain or lack thereof is the key peril, a screening of long-term averages, variability, and maximum and minimum values is useful in most situations.

Given that the focus of this Feasibility Study is drought, Figure 8 presents the rainfall patterns recorded at Pringgabaya and Maros weather stations. It is interesting to highlight the differences in the rainfall patterns from the two areas. First,

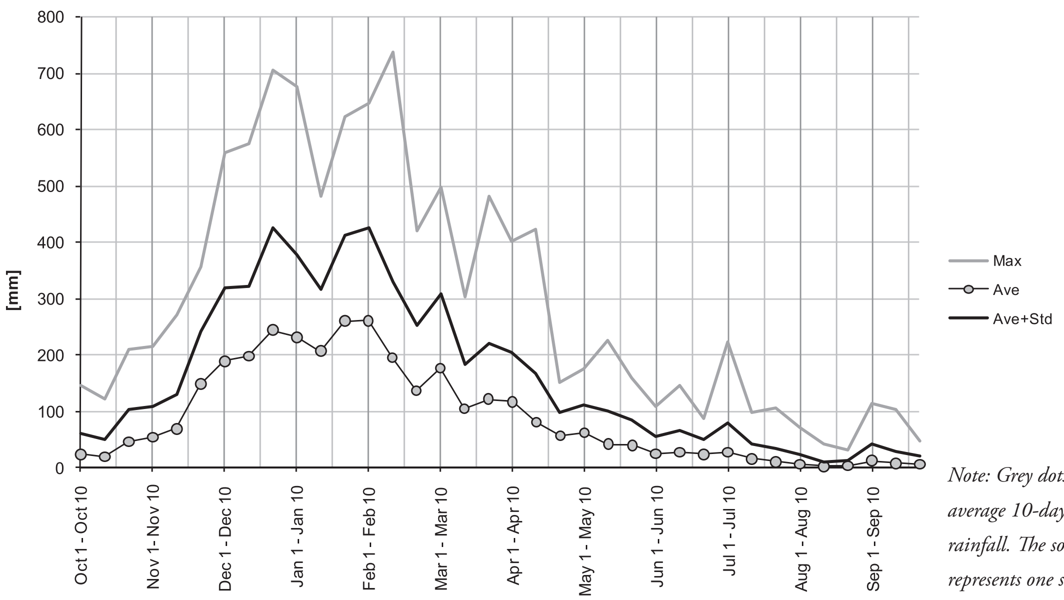
10 Given that WII contracts focus specifically on the impact of drought (i.e. lack of rainfall) the subdivision and the length of the contract phases are slightly different from the phases reported in Figure 7.
11 A "dekad" is a ten-day period. The last dekad of each month may include more or less than ten days
12 The actual value can change according to local conditions such as soil type, type of crop and cultivating practices.
13 Alternatively, it is possible to structure the same index contract with a range of fixed starting dates leaving the farmer with the option of selecting his/her preferred starting date. The choice of adopting a fixed or a dynamic starting date contract type largely depends on local conditions and on the preferences of both insured and insurers, and the extent of variation normally experienced in starting dates.

it should be noted that the level of precipitation around the Maros station is significantly higher than that around the Pringgabaya station (at their peak, an average of 50mm per ten-day period in Pringgabaya and an average of 250mm per ten-day period in Maros). In addition, in Maros, on average, the rainy season starts one month before and ends one month after the rainy season in Pringgabaya. These climatic differences, which allow Maros farmers to carry out two maize crops and constrain the Pringgabaya farmers to only one maize crop per year, are critical in determining the structure of the index contracts.[14]

Figure 8. Rainfall seasonal cycle recorded at Pringgabaya and Maros



(a) Pringgabaya



(b) Maros

Note: Grey dots represent the average 10-day accumulated rainfall. The solid black line represents one standard deviation of the 10-day accumulated rainfall from the average. The solid grey line is the maximum observed ten-day accumulated rainfall.

14 More details on the analysis of weather and agricultural data are provided in Annex 1.

5.5 Payout structures: typology and definitions

Each of the drought phases developed for the maize drought contracts in Maros and Pringgabaya are based on the typical capped option contract typology, characterized by a *Trigger*, an *Exit* (maximum payout) and a *Tick* (or *Tick size*). The terminology adopted to characterize the contract structure is the following:

Index, Weather Index: A quantity derived by suitable calculations performed on the weather data recorded at the selected weather station.

Trigger: Threshold above or below which payouts are due (for a drought coverage, payments are due when the calculated value of the index is below the trigger level).

Exit: Threshold above or below which no additional incremental payout will be applied (for a drought coverage, the maximum payout is paid if the calculated value of the index is equal to or below the exit threshold).

Sum Insured: The agreed sum insured value per hectare, multiplied by the number of hectares insured.

Tick: incremental payout value per unit deviation from the trigger. For example (Figure 9), if for a rainfall index contract the maximum payout (the insured sum) is 1,500,000 IDR, given a trigger of 300mm and an exit of 150mm, the monetary value of each deficit mm of rainfall below the trigger is:

1,500,000 IDR/(300 mm-150 mm) = 10,000 IDR/mm.

Total Maximum Payout: Maximum payout that will be paid by the weather index insurance contract. In case of a contract characterized by multiple phases, the sum of the payouts for each phase cannot exceed the Maximum Payout. The Total Maximum Payout is also the Sum Insured stated in the contract.

The payout P of a rainfall index contract phase that targets drought events is determined as follows:

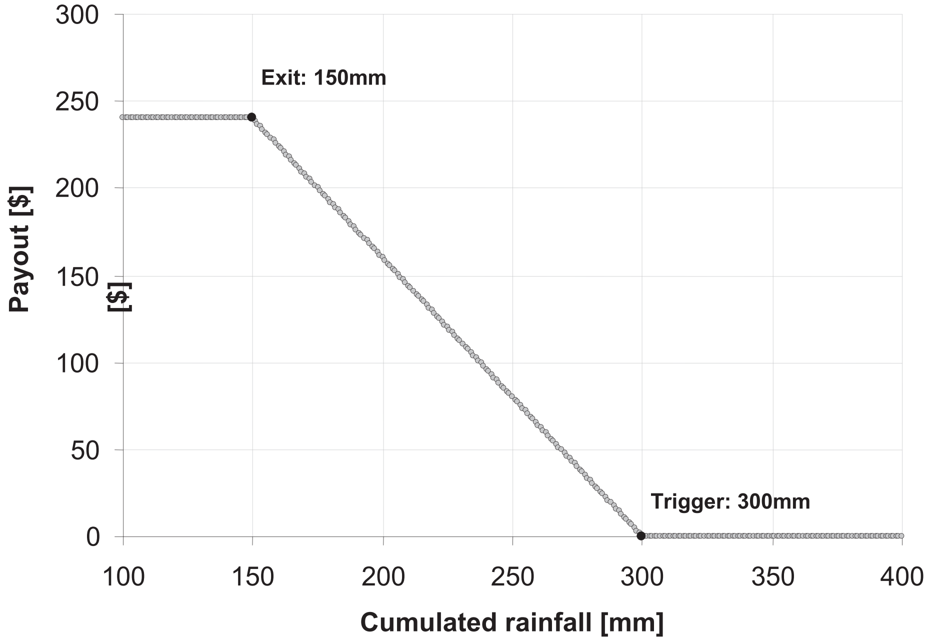
$$(1) \quad P = \max\left[0, \min\left(Tick \cdot (Trigger - Ranfall\ Index), Max\,Payout\right)\right]$$

Figure 9 illustrates the payout structure of a typical drought coverage phase.

If cumulated rainfall in the selected period is

i. more than 300 mm ("Trigger"), there is no insurance payout;
ii. less than 300 mm, the incremental payout depends linearly on the amount of cumulated rainfall measured;
iii. less than 150 mm ("Exit"), the payout does not increase above the maximum amount.

Figure 9. Example of a payout structure for a drought coverage phase



5.6 A Rainfall Index Contract Prototype for Maize in Pringgabaya

The rainfall index contract developed for maize in Pringgabaya was structured around the following assumptions:

- Production costs: IDR 2,000,000 /Ha
- Potential yield:[15] 3,500 Kg/Ha
- Maize sales price: IDR 1,500 /Kg
- Potential revenue: IDR 5,250,000 /Ha
- Reference yield for contract performance analysis: 2,100 Kg/Ha (60% of potential yield)[16]

The parameters of each of the three contract phases are presented in Table 4.

15 For this purpose, "potential yield" is defined as the maximum output level that the crop could potentially yield in optimal soil moisture conditions.

16 The "reference yield" is the yield threshold selected to determine when a payout is needed. It is important to keep in mind that in rainfall index insurance the actual payout trigger is *rainfall* as measured at the reference weather station, not yield. However, for performance evaluation purposes it is useful to set a reference *yield* level below which payouts should be provided.

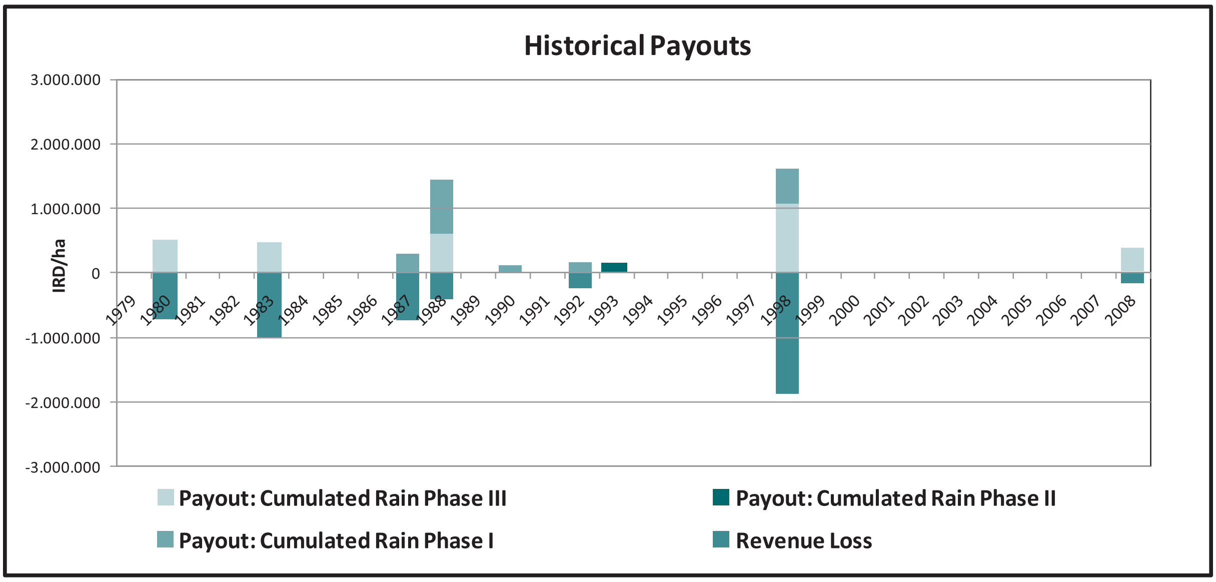
Table 4. Parameters of rainfall index contract for maize cultivation in Pringgabaya (per hectare)

	Trigger (mm)	Exit (mm)	Max Payout (IDR)	Tick (IDR/mm)
Phase 1: Dekads 1 and 2	45	10	800,000	22,857
Phase 2: Dekads 3 to 5	10	0	500,000	50,000
Phase 3: Dekads 6 to 9	85	20	1,500,000	23,077

Figure 10 provides a graphical representation of hypothetical performance of the Pringgabaya contract on the basis of historical rainfall patterns. The figure shows that for every year in which production fell below the reference yield of 2.1 tons/ha (blue bars) the rainfall contract provides a payment.[17] In some occasions payments are triggered in one phase only, while in other cases (1988 and 1998) payments are triggered in two phases. The contract also triggers payments in the years 1990 and 1993 when there are no production losses with respect to the selected threshold. Such payments are negligible, however, and have a minimal impact on the actuarial performance of the contract. The most important feature is that payouts would have been triggered in the years of predicted losses.

Figure 10 also shows that, as expected, phases 1 and 3 are the most sensitive growth stages to drought and that phase 2 does not trigger any significant payment.

Figure 10. Historical Payouts for the rainfall index maize contract for Pringgabaya



NOTE: Revenue losses are estimated through the WRSI methodology described in Annex 1

17 See Annex 1 for more information on how revenue loss data has been generated.

5.7 Rainfall Index Contract for Maize in Maros

The rainfall index contract developed for maize in Maros was structured around the following assumptions:

- Production costs: IDR 3,000,000 /Ha
- Potential yield: 5,000 Kg/Ha
- Maize sales price: IDR 1500 /Kg
- Potential revenue: IDR 7,500,000 /Ha
- Reference yield for contract performance analysis: 3,000 Kg/Ha (60 % of potential yield)

The parameters of each of the three contract phases are presented in Table 5.

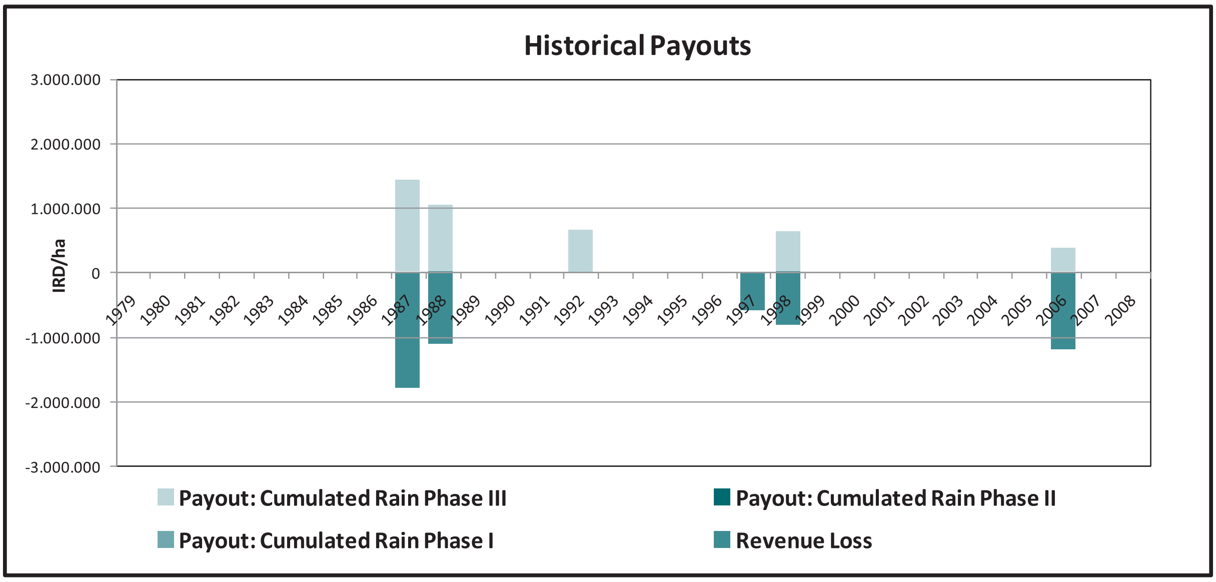
Table 5. Parameters of rainfall index contract for maize cultivation in Maros

	Trigger (mm)	Exit (mm)	Max Payout (IDR)	Tick (IDR/mm)
Phase 1: Dekads 1 and 2	70	30	1,000,000	25,000
Phase 2: Dekads 3 to 5	100	50	1,500,000	30,000
Phase 3: Dekads 6 to 9	60	10	2,000,000	40,000

Figure 11 provides a graphical representation of hypothetical performance of the Maros contract on the basis of historical rainfall patterns. The coverage performance of the Maros contract is comparable to that of the Pringgabaya contract. It is worth noting that the smallest of the revenue losses (1997) is not matched by a payout and that a payout is triggered in 1992 without having recorded a loss in that year (no blue bar in 1992). However, the overall performance of the contact can be considered acceptable.

Unlike the Pringgabaya example, for which payouts were triggered in both the first and the third phase, the Maros contract triggers payouts only in the third phase. This is consistent with the observed features of maize cultivation in Maros where the first phase of maize crop cultivation occurs when rains are still substantial and no drought risk is evident.

Figure 11. Historical Payouts for the rainfall index maize contract for Maros



NOTE: Revenue losses are estimated through the WRSI methodology described in Annex 1

5.8 Pricing WII contracts: determining "Expected Loss"

Providing preliminary indications on the pricing of a WII contract can be considered the final step in the technical feasibility analysis. Although the market price of an insurance contract (the "premium") has various components, it is first necessary to determine the "expected loss" (or "pure risk premium") embedded in the WII contract.[18] Computing the actual insurance premium is a prerogative of the insurance and reinsurance industries, but by assessing the expected loss (EL) it is possible to screen potential WII structures and provide a better indication of the actual feasibility of such contracts.

The EL is defined as the arithmetic average payout of the contract in question. This is also known as the Historical Burn Analysis (HBA) approach to calculating the EL.

Since it reflects the risk associated with the proposed contract, the EL is usually adopted as the main indicator of the feasibility of an insurance contract. A high EL indicates that the activity to be insured is extremely exposed to risk and, besides shedding doubt on the sustainability of the activity in question, it suggests that the insurance proposition may not be a viable one.

What values can be considered an acceptable range of EL values must be determined empirically, as it is influenced by many factors. Any contract with an EL significantly greater than 10 percent, however, can be considered in the low range of sustainability, due to likely unacceptability or affordability of the commercial premium costs.

The estimated EL for the Maros and Pringgabaya coverage described above are, respectively, 10.5% and 8.7%. These figures are to be considered close to the upper bound of an acceptable "pure risk premium". It is to be remembered that the EL is only one part of the final insurance premium and that, when loaded for uncertainty; problems in quality of

18 The price components that need to be added to the pure risk premium in order to determine the final price of the policy are: uncertainty; problems in quality of data; reinsurance costs; administration costs and profit.

data; reinsurance costs; administration costs and profit the actual cost of the coverage can increase significantly, making the insurance proposition even more expensive.

5. 9 Conclusions

Summarizing the findings of the analysis presented above, it is possible to conclude that rainfall index contracts designed to address drought risk in maize cultivation in Maros and Pringgabaya can provide appropriate coverage. For the cases explored, index insurance can be considered "technically feasible". As for economic or commercial feasibility, the estimated "pure risk premiums" seem close to the upper boundaries of what is likely to be acceptable to farmers. The final verdict on the actual suitability of the prototype contracts should be left to the end-user, who may still find it convenient to purchase expensive insurance coverage if it provides significant protection from a relevant risk, or if it grants access to sources of funding otherwise not accessible. Therefore, the actual "economic/commercial feasibility" of a WII product can only be determined through an appropriate pilot test.

CHAPTER SIX

BUSINESS MODELS AND STAKEHOLDERS' INTEREST IN WII

6.1 WII Business models[19]

Figure 12 summarizes the most frequent marketing arrangements that have been used to sell WII so far. In general terms, these arrangements can be classified as schemes in which (a) insurance policies are retailed through an intermediary, such as a credit institution (bank, credit cooperative, MFI) or an agribusiness firm; or (b) the contracts are directly distributed by the underwriting insurance company.

The selection of the most suitable option needs to be based on local conditions, such as the nature of the commodity supply chain for which WII will be developed, the structure of the financial services industry, and the business interests of the various stakeholders.

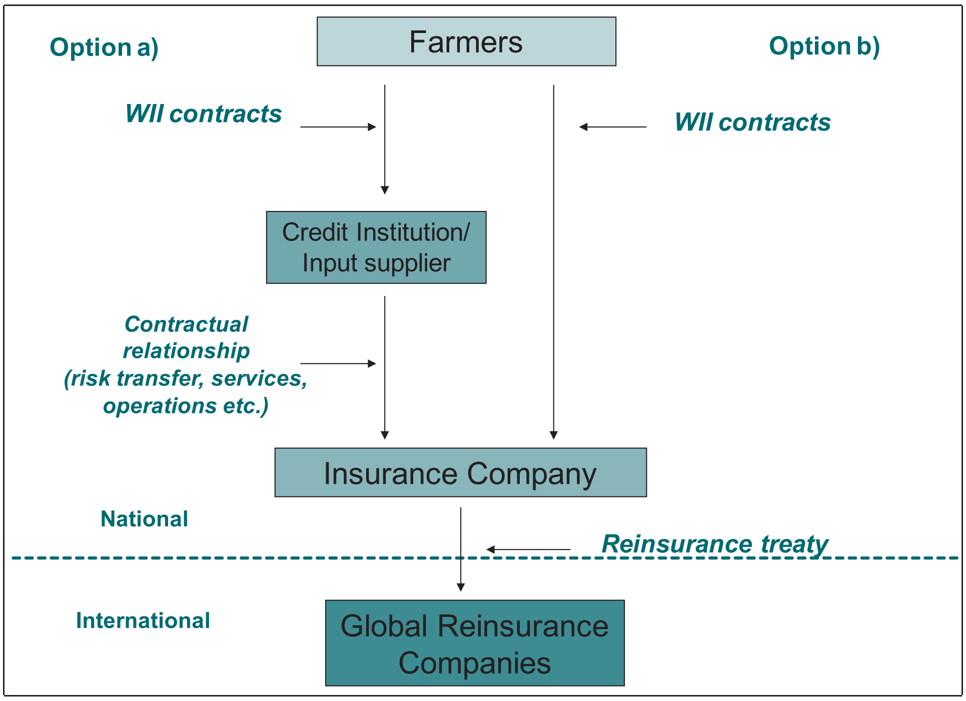
Going through an intermediary offers the advantage of distributing insurance through an existing retailing network of the business partner, potentially facilitating outreach to large numbers of clients. Such business partners may have a strong incentive to facilitate the distribution of WII products. For example, a credit institution like a bank may be interested in linking WII to loans in order to reduce default rates generated by adverse weather events; while agribusiness firms may view WII as providing a promotional advantage for their products, as well as providing added security to farmers who are their suppliers.

If an insurance company enjoys broad outreach in rural areas (e.g., mutual or cooperative insurance companies), that underwriter could directly retail the policies. In this case, it is useful to carefully evaluate farmers' interest in purchasing the "stand-alone" WII product. Experience shows that it may be easier to retail insurance when linked to a loan or to an input product.

When setting up the risk-transfer proposition, it is also important to make sure that the underwriter has access to appropriate reinsurance coverage. WII transactions are highly exposed to covariate risk (i.e. risk that affects the majority of the insured parties at the same time) and in the case of a triggering event, payouts tend to be significant. Figure 12 indicates that regardless of the retailing scheme adopted, the insurance company must have access to reinsurance, usually at the international level.

19 Adapted from IFAD, A Technical Guide for Weather Index Insurance, in preparation.

Figure 12: Risk-transfer business model options



As the main players on the supply side of WII are insurance companies and credit institutions, we provide an overview of both sectors and recount the expressed opinions of representatives of the two industries regarding the potential for WII in Indonesia. These opinions were collected by the Feasibility Study team during several dedicated seminars.[20]

6.2 Agricultural Insurance in Indonesia

Property insurance which covers natural disasters such as earthquakes is available for homeowners and businesses in Indonesia. Agricultural insurance which protects producers and agribusinesses is a small line of business dominated by domestic companies, and is currently limited to the insurance of standing timber such as rubber, oil palm, cocoa, coffee and coconut. A pool has been formed, but there does not appear to be any widespread insurance product development and coverage for the agricultural sector.

The Government of Indonesia has several times attempted to introduce agricultural insurance. Between 1982-2002, the government formed three working groups comprising representatives from the public and private sectors in order to develop crop and livestock insurance, with no concrete results. Several constraints to the development of agricultural insurance were encountered, including the lack of awareness and on the part of farmers, the general inability of farmers to pay premiums, lack of conducive agricultural insurance regulations etc.

The latest government initiative, spearheaded by the MoA through its Division of Access to Finance and Credit, looks to implement three parallel business models for agricultural insurance. In the first model, the Government will pay the full premium cost on behalf of farmers. A second, commercial approach will also be tried, whereby the Government links input suppliers and agribusinesses with insurance companies. Finally, a credit-linked approach will be tested whereby farmers are required to buy insurance in order to get access to credit.

20 The explorations carried out during the Feasibility Study did not elicit specific interest from supply chain players for setting up WII retailing schemes such as the ones piloted in Kenya (http://www.syngentafoundation.org/) or in India (IFAD – WFP, 2010).

Under the first, government-led approach, the MoA is currently implementing a small pilot program in West and Central Java. The pilot is in its first year and offers two types of agricultural insurance: 1) a multi-peril crop insurance (MPCI) product for rice; and 2) a livestock insurance product covering death and theft for cattle. The premiums are 3.75% of production cost for the MPCI product, and 3.5% of the animal value for the livestock product respectively. The program covers 600 farmers with a total production area of 100 hectares, and 135 animals which belong to 135 farmers. The program operates through an umbrella agreement between the MoA and Daspindo (an insurance broker). Premiums are fully paid by the Government through Daspindo which coordinates ten insurance companies participating in the scheme. Pilots to test the the commercial and credit-linked approaches are being developed.

The MoA is contemplating a broader roll-out plan to extend beyond the first year of the West and Central Java pilot program. Potential activities for the second year include the extension of the program within the same areas or to new areas, increased government sponsored research and development for new insurance products, and most importantly, a proposal to use part of the unused "disaster budget" to pay for premiums. During seminars carried out as part of the Feasibility Study, a representative from the Ministry confirmed that MoA is currently budgeting to pay premiums for the first couple of years before farmers will be asked to bear the insurance costs. MoA's representative also raised the possibility of forming a new working group on agricultural insurance, , and of including premium subsidies for WII if the product is determined to be viable.

6.3 View of WII by the Indonesian Insurance Sector

In order to gather insurance industry feedback on the potential of WII for agricultural risk management in Indonesia, a specific discussion seminar was organized.[21] The event was attended by key insurance market players (see the list of attendants at the end), and received strong support from the General Insurance Association of Indonesia.

The event reviewed the key principles and business considerations for WII, and presented the drought index contract prototypes developed for maize production in Eastern Indonesia.[22] To set the context, the various steps required to develop a WII contract were carefully explained.

Insurers were given the opportunity to ask for technical clarifications in order to have a clear understanding of the prototype contract, thus providing informed feedback to the Feasibility Study. Key questions posed by the insurers were related to: 1) the adequacy of the meteorological infrastructure in Indonesia and the credibility of weather data; 2) the challenges of communicating technical concepts to farmers; 3) the potential to combine different indexes (such as rainfall and temperature) within one product, or the index product with other products (such as life, health, and livestock insurance); and 4) the ability of index products to satisfy regulatory requirements for insurance given Indonesian law.

Following the presentations and the discussion on the technical details of WII contract design, insurers were asked to respond to the following questions:

1) What are the main challenges for the development of a WII market in Indonesia?

2) How should a potential retail scheme for WII be developed to reach out effectively to potential clients? Should it be conceived on a stand-alone, voluntary basis, or should it be linked to lending activities?

3) The development of WII requires a significant effort in terms of "research and development". What capacities exist in the insurance industry and what are the areas that external expertise is important? Is there scope for a

21 Seminar for insurance companies: "Discussion on Index Insurance", 4 August 2009, The Mulia Hotel, Jakarta. See Annex 5 for a list of participants.
22 See Chapter 5.

joint collaboration between the various insurance companies in this respect?

4) Is the Indonesian institutional framework (i.e. existing regulations, availability of weather data, government support, etc.) conducive to the development of a weather index insurance market?

Key issues and findings

i) Technical challenges are not a primary concern, but insurers need capacity building.

The technical issues related to product development are not perceived to be a major constraint for the product. The insurers indicated that they understood well the principles and methodology by which weather data are used to construct and rate the index product. MAIPARK, which is an insurer with expertise in special risks, commented that the product "looks good technically", in addition to having a simple administrative and claim processes.

But while being technically appealing, the WII product does rely heavily on the availability and credibility of data provided by a third party. While insurers are used to working with an independent third party in loss adjustment for other products, the idea of having a government body supplying data for a WII program is quite new. To develop the program, the insurers indicated that they need to be assured of the quality of data provided by the National Meteorological Office. Equally importantly, they also need to have confidence in both the willingness and capacity of the National Meteorological Office to be a data service provider. A framework for collaboration framework appropriate for such a business relationship needs would need to be developed.

Finally, WII is very new for the Indonesian insurers themselves, not to mention the public. The insurers need to build new skills to develop and maintain the product. To move forward, the Indonesian industry will need more capacity building and technical assistance/international collaboration both in terms of awareness-raising seminars and technical training targeting key players. The Feasibility Study team agreed with the insurers about the importance of capacity building and explained that international experience from countries with large scale programs (such India and Mexico) has shown that investing in a dedicated team is key to developing a sustainable, large scale WII business. To this end, the Indonesian insurers indicated that donor support for capacity building may be needed.

ii) Demand for insurance products and volume of business are perceived to be more important challenges.

Insurance awareness is generally very low in Indonesia. Among the insurers attending the seminar, only MAIPARK had actual field experience explaining earthquake insurance to rural dwellers in 200 villages across country. The consensus is that the understanding about insurance in rural areas is very low. It is doubtful that those few farmers who buy insurance actually understand the coverage they have purchased. Culturally, some people may believe that insurance is counter to "the Act of God." Apart from a general lack of knowledge among the insured, one insurer also commented that one might need to raise awareness of local governments, data agencies, and regulators themselves in order to make a new insurance program successful.

Insurers see that communicating with farmers about an insurance product–be it traditional or index-based—will be very challenging. A firm understanding of the product is very important for demand, especially if the product is to be purchased voluntarily. Even in cases where good communication efforts would lead farmers to purchase the coverage, insurers would still be concerned that farmers will ask for payout regardless of the cause of loss. This problem could be more serious with WII as farmers are not familiar with the idea of a single-risk coverage product (i.e. one that pays out only for the triggering of the indexed risk). Second, premium affordability is also another key consideration for farmers. Many farmers will not have extra money to pay the premium, while others might see insurance as an unnecessary expense.

The factors noted above underscore insurers' concerns about the potential volume of business that WII might generate. While implementing a pilot in Lombok could help towards understanding the market potential of WII, in the long run insurers will need to be convinced that a substantial market for the product exists. This would require a careful mapping of the country's crops, risks, and potential demand. Identifying the crops and areas with business potential will be key to determining the extent of demand, as insurers recognize that the product is not meant to be appropriate for all farmers regardless of location or crop.

Most insurers believe that a way to overcome the demand issue is to make insurance mandatory. In Indonesia, demand for insurance is usually generated by lenders' requirements. While experience has shown that compulsory insurance can be effective, however, there are also cases whereby borrowers resist insurance if they have the full knowledge that the product is forced on them by banks or leasing companies. And in some cases, making new insurance products mandatory might require special approval from the Government or the insurance regulator.

In the discussions, Indonesian insurers were informed that the general lack of demand for insurance is not a phenomenon unique to Indonesia. Demand for insurance is universally low, and insurance by itself is hard to sell. In many countries, successful crop insurance programs are ones which link insurance to other financial and non-financial products and services, thus making insurance a better value proposition for farmers. For example, demand will likely increase if a WII product can help lower the interest rate for farmers borrowing from banks or cooperatives. It was agreed that if such a value package could be developed in Indonesia, demand for WII could be generated, potentially supporting an attractive volume of business.

iii) Partnership between insurers and banks will be a win-win model for WII.

There was full agreement among the insurers at the seminar that the partner-agent agent model will be the most promising business model for WII. Apart from making the product more attractive by linking it to loans (and by so doing making more farmers bankable), the partnership between insurance companies and banks in retailing will also be cost-effective for many reasons. Most importantly, insurers will not have to set up new retail offices, relying on staff of banks and cooperatives as sales agents. This is significant because the partner-agent model capitalizes on the comparative advantage of banks and cooperatives in dealing with individual farmers, while the insurers are better equipped to deal with other financial institutions. Since the retailing costs under this business model would be lower, the insurers also believe that it will help to keep premiums low, thus allowing more farmers to purchase the coverage. Because making insurance compulsory could create discontent among borrowers, a mechanism by which WII could be linked to loans under the partner- agent model needs to be carefully designed.

iv) A special pool arrangement among insurance companies is likely needed for WII.

While WII administrative costs might be low, insurers believe that the upfront R&D costs for developing WII products will be high. For other perils such as fire, the insurers only need to develop one standardized product with one coverage level and one premium rate for the whole country. The R&D effort required to develop WII products suitable for several regions of Indonesia, however, represents a significant barrier. Since each region in Indonesia has its own risk characteristics, developing a wide range of index products tailored to different cases will require a significant amount of R&D funding. Given the amount of resources required, the insurers perceive that it is practically impossible to have an individual company conducting separate R&D. It was proposed that a special collaboration among insurance companies will be needed, perhaps in terms of setting up a consortium or a pool, to develop this product. Some participants suggested that MAIPARK, which has experience setting up a mechanism for earthquake risk, should consider taking the lead in a new pool. In addition, such a pool could be aided by a donor agency, which might also provide subsidized funding.

Interestingly, MAIPARK cautioned against any great expectation regarding the creation of a new pool for a new product. According to MAIPARK, creating an insurance pool is not easy because the pool leader needs to understand the capacity --technical and financial-- of each and every participating company. Forcing capable companies to join a compulsory pool will be difficult. In addition, creating a pool to develop and underwrite special risks (such as earthquake, adverse weather risks, etc.) needs a lot more time and money than other types of risk, and the pool will not see results in the short run. MAIPARK did agree, however, that separate R&D by individual companies will not be cost-effective. Therefore, at least an R&D pool would be needed to develop WII. The Government must also be involved in supporting any pool, at the very least in terms of providing the data required to construct an index.

v) **While it is likely that the insurance regulator would approve WII products, there are legal issues that must be clarified.**

Insurers need to make sure that any policy introduced has standard, concise and understandable language. Farmers need to be able to understand the coverage. Policy wording is very important and is one of the key criteria upon which product approval will be based. In addition, the weather index and premium rate presented in the policy must be supported by robust statistics.

Second, legal protection of farmers covered by WII policies must be ensured. Though the product may be legally approved, the regulator does not govern the functioning of other institutions whose role is essential in helping the farmers realize a legal claim, e.g., BKMG. Therefore the legal protection of insured farmers in relation to other institutions involved in implementing the insurance program has to be clarified.

Finally, the legal basis for any created insurance pool must be made clear, or insurers will be unwilling to spend time and resources in support of a joint initiative.

vi) **Conclusions.**

The bottom line is that insurers participating in the seminar view the WII product as having potential for Indonesia. Successful introduction of the product depends upon how the key constraints discussed above can be overcome.

6.4 Credit in Indonesia's Agricultural Sector[23]

The Role of Agricultural Credit

In Indonesia's agricultural economy the role of credit is critical. Outside of the large-scale plantation type enterprises, the agriculture sector operates on close to a subsistence level and expenses can seldom be financed without some access to credit.

Agricultural credit can be distinguished from rural credit, which refers to the location rather than to the nature of activities financed. The development of agricultural credit cannot be separated from the rural financial[24] markets which encompass all formal and informal financial credit and savings activities taking place in the rural economy. Thus, the provision of agricultural credit will be considered within the broader context of Indonesia's rural financial markets.

23 Adapted from Country Finance, The Economist Intelligence Unit (EIU) released in June 2009
24 Rural Finance as defined by the World Bank (WB Report – 2004) includes a range of financial services such as savings, credit, payments and insurance to rural individual, households and enterprises both firms and non-firms, on a sustainable basis. It includes financing for Agriculture and Agro-processing/Agribusiness.

Demand and Supply for Agriculture Credit

Demand. The natural demand for short-term credit (repaid in less than one year) arises primarily because of the seasonal cycle of food production and the relatively constant pattern of consumption of output. Finance is needed for peak production inputs and for consumption requirements on the farm. Needs change at during the period of harvest when the farmer can convert crops to cash. Credit is required on and off-farm to process, move and store the commodity between harvests and maintain stocks to permit the balancing supply and demand in the market without undue market fluctuations. In addition, medium and long term finance is required both on farm and off-farm. Plantation crops such as palm oil, cocoa, rubber, and coffee require medium-term finance, while investment for irrigation and infrastructure require long-term finance.

Supply. The supply of credit is made available by public and private institutions ranging from formal or institutional sources and informal or non-institutional sources. The informal channel is composed of private money lenders, relatives, friends, and supply traders. Meanwhile, formal channels are mainly comprised of commercial banks, BPRs[25] and KUDs.[26] In the early 1970s, the informal channel constituted the bigger source of credit among farm families for consumption and production purposes. The supply of informal credit is much higher than formal credit. As for formal credit sources, the Indonesian government has promoted agricultural credit by means of interest rate subsidies since 1970. However, there was an adjustment to this policy in 1984, mainly due to the government's fiscal reconstruction and the huge arrears on subsidized agricultural loans. Since then, loan interest rates are generally set on a commercial basis, though the government has persisted in providing small amounts of subsidized credit to strategic crops such as rice.

Indonesian agricultural credit is still dominated by commercial banks (97%), particularly state-owned banks (Mandiri and BRI), whose agricultural exposure (total loans outstanding) at year-end 2007 stood at 10 percent and 10.9 percent, respectively. Most of government credit programs are channeled through these banks. Excluding Bank Agro[27] (which despite its high exposure in percentage terms, has a relatively portfolio), most banks are still reluctant to lend their own resources to what they perceive to be a very risky activity, and therefore only pass government money through to farmers.

25 BPR (Bank Perkreditan Rakyat) is the people's credit bank.
26 KUD (Koperasi Unit Desa) is Agricultural cooperative in Indonesia.
27 Bank Agro (PT Bank Agroniaga Tbk) is a private bank controlled by Estate Pension Fund (DASPENDBUN) as manager of pension fund of PT Perkebunan Nusantara's employees. PT Perkebunan Nusantara are state-owned plantation enterprises especially plantation crops such as palm oil, sugar cane, rubbers, etc. Bank Agro's mission is to develop the agricultural sector.

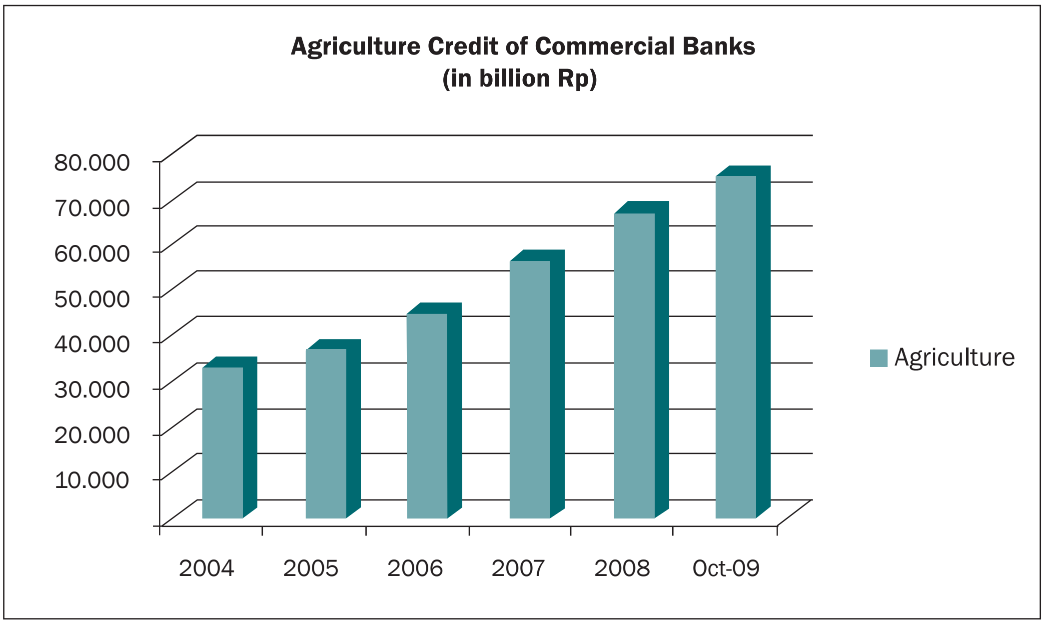
Table 6: Top agriculture lenders – commercial banks
(as of December 31, 2007; all the figures in millions - 1 USD=IDR 10,000)

NO	BANKS	TOTAL LOANS OUTSTANDING		OUTSTANDING LOANS TO AGRICULTURE SECTOR		% of Agriculture Exposure out of total O/S
		IDR	USD	IDR	USD	
1	Mandiri	125,488,384	12,549	12,532,772	1,253.28	10.0%
2	BRI	112,838,806	11,284	12,267,860	1,226.79	10.9%
3	BII	28,486,465	2,849	3,135,759	313.58	11.0%
4	BNI	65,321,741	6,532	3,072,329	307.23	4.7%
5	Niaga	41,746,587	4,175	2,880,846	288.08	6.9%
6	BCA	82,388,633	8,239	2,736,703	273.67	3.3%
7	Permata	26,489,385	2,649	1,961,151	196.12	7.4%
8	Agro	1,956,450	196	838,687	83.87	42.9%
9	Danamon	51,337,052	5,134	834,290	83.43	1.6%
10	Bukopin	14,682,987	1,468	825,367	82.54	5.6%
11	NISP	19,113,922	1,911	413,789	41.38	2.2%
12	Mega	14,037,263	1,404	148,072	14.81	1.1%

Source: Bank Indonesia

Although commercial banks' exposure to agriculture credit is still low compared to other sectors such as manufacturing, trade and business services, the total amount of credit disbursed has been steadily increasing over the past 6 years.

Figure 13: Agricultural Credit of Commercial Banks



Source: Bank Indonesia statistical reports

6.5 Considerations on WII by the Indonesian Banking Sector

Banks and multi-finance companies are certainly among the key players financing agriculture supply chains and they could potentially be involved in a partner-agent association with insurance companies for retailing WII products. To explore the role of WII in enhancing access to credit for farmers, a focus group discussion with credit institutions was organized with the following key objectives:[28] 1) illustrate the concept and application of weather index insurance; 2) demonstrate the relevance to Indonesia by discussing a contract prototype; and 3) explore the perceptions of lending institutions about the potential of WII to enhance farmers' access to agricultural finance. The focus group discussion was attended by 5 representatives of credit institutions including BRI, BISMA , and PNM . In this context, both BISMA[29] and PNM[30] represented the BPR (rural bank) industry.

Key issues and findings from the focus group discussion

i) **BRI and most of BISMA's rural bank partners are currently engaged in retailing insurance, though the scope of this activity is limited. The most common form of insurance which borrowers are required to purchase is "credit life".** BRI has its own insurance company which offers the coverage but also partners with other insurers for the product. BRI also offers life and accident insurance to borrowers. On the other hand, most of BISMA-supported rural banks, as well as some of its rural cooperatives, partner with insurance companies to offer credit-life products. BISMA does not require its partners to offer insurance.

ii) **All parties believe that WII could play a role in reducing risk exposure, thus improving "bankability" of farmers.** The suitability of the WII instrument needs to be determined on a case-by-case basis. For example, all representatives agreed that weather risk is a key factor in crop production losses in Eastern Indonesia; the case is unclear for areas such as Java and Bandung which are thoroughly irrigated.

iii) **Even in the cases whereby WII is suitable, the capacity of farmers and their willingness to pay premiums is a concern.** However, this issue can be partially overcome by introducing the product as part of a loan package which by nature makes the insurance compulsory. BRI thinks that making insurance part of the loan package is not difficult; this can be efficiently done by framing the product as a "benefit" offered by the bank to the borrowers, while including automatically the insurance premium in the price of the loan (interest rate, fees charges). The bank already takes this approach with other insurance products.

28 Focus group for credit institutions on "Agricultural Credit and Weather Index Insurance", 20 August 2009, The Mulia Hotel, Jakarta. See Annex 6 for a list of participants.

29 BISMA (P.T. Bina Insan Sejahtera Mandiri) is a private company founded in October 2002 by CARE International with the aim to participate in the development of microfinance in Indonesia. BISMA began commercial operations in March 2003. It provides loans and technical capacity to its MFI partners including BPRs and cooperatives. BISMA itself is not directly engaged in agricultural lending but partners with rural banks that do. BISMA's partners have a strong presence in Greater Jakarta, Java and are expanding in South Sulawesi. BISMA has only a few partners that lend for agriculture and estimates that agricultural loans do not account for more that 50% of the portfolio of these rural banks

30 PNM (P.T. Permodalan Nasional Madani) is an apex microfinance institution that was founded in 1999. PNM is a state-owned corporation with the strategic objective to provide financial services encompassing government credit program and management services for the development of micro, small and medium enterprises (MSMEs).

CHAPTER SEVEN

REGULATORY ENVIRONMENT AND THE POSITION OF THE INSURANCE SUPERVISORY AUTHORITY ON WII

7.1 Insurance regulation

The regulatory foundation supporting the insurance sector in Indonesia was laid by the Law Number 2 of 1992. This law was modified significantly in 2000 by the introduction of risk-based capital requirements.

The law is further elaborated through implementing regulations.

Insurance Business includes:

- Peril insurance: a service to overcome the risk of loss and legal responsibility to third parties that emerge from uncertainty.
- Life insurance: a service to overcome risks that are related to life or death of someone that is covered.
- Re-insurance: a service of re-covering of risks of loss and life insurance companies.

Insurance Business' Supporting Activities consist of:

- Insurance brokerage: intermediary services in the closing of insurance and handling of compensation provision; the business acts on behalf of the insured.
- Reinsurance brokerage: intermediary services in the placement of reinsurance and handling of reinsurance compensation provision; the business acts on behalf of the insured.
- Loss adjustment: assessment service on the loss of insured objects.
- Actuary consultancy: business that provides actuary consultation service.
- Insurance agent: intermediary service in the marketing of insurance service for and on behalf of the insurance company.

While Law Number 2 of 1992 regulates insurance business activities, the agreements that emerge as the result of an insurance contract are regulated separately in the Commercial Code (KUHD).

A government regulation was issued in March 2008 (No. 39/2008) and, among other changes, imposed new minimum capital levels for all insurers of IDR 40 billion by year-end 2008 and IDR 100 billion by year-end-2010. Several industry lawyers claimed that the regulation would lead to the end of the insurance industry in Indonesia. In December 2008 the government issued another regulation (81/2008) amending these minimal capital requirements for insurers to IDR 40 billion by year-end 2010 and IDR 100 billion four years later. Sharia units belonging to insurance companies were required to achieve minimum capital levels of IDR 5 billion by year-end 2008 and must reach IDR 25 billion by year-end 2010. The regulation is expected to provoke consolidation in the industry. Other elements of the original regulation that were unchanged by the revision include required capital levels of IDR 100 billion for newly licensed life insurers, IDR 200 billion for newly licensed re-insurers, IDR 50 billion for Sharia insurers, and IDR 100 billion for Sharia re-insurers. The regulation also provides for sanctions between IDR 180 billion and IDR 360 billion for administrative infractions and empowers the Minister of Finance to transfer insurance portfolios from an insurance company in financial distress to another company.

7.2 Insurance Supervisory Authority

The Insurance Bureau is the non-life insurance supervisory authority. The Bureau resides within the Capital Markets and Financial Institutions Supervisory Agency (known as BAPEPAM). The Insurance Bureau head reports to the director general of financial institutions of BAPEPAM. The Insurance Bureau has four departments, including licensing, operations, financial analysis and audit. The current head of the Insurance Bureau is Isa Rachmatarwata who was appointed in early 2006.[31]

Industry and professional organization including the Indonesian Insurance Council (DAI), the General Insurers Association (AAUI), Association of Indonesian Life Insurance Companies (AAJI), also play a role in supporting the industry. Under the Law No. 2 of 1992, regulation was focused on protecting the industry in general and the domestic industry in particular. Growth of the industry was the priority. Since 2000 there has been a shift in focus by the industry regulator. The primary emphasis used to be on encouraging the survival of companies, secondarily on enforcing the law, and lastly on protecting policyholders. Now, protecting policy holders is the first priority. Enforcing the law retains its importance, but safeguarding the survival of individual insurance companies is now considered a less important objective. The new industry framework is built around three pillars: consumer protection, distribution requirements, and minimum standards. Consumer protection supports policyholders' rights and protects against unfair or inconsistent treatment. Distribution requirements refer to the minimum qualifications that agents must meet before being authorized. Brokers must now meet minimum industry qualifications including professional indemnity and fidelity bonding (licensing eventually could be replaced by Indonesian professional qualifications and self-regulation). Participants in the industry must meet he minimum requirement of solvency (risk-base management), and product, investment and business standards.

7.3 Requirements of the Insurance Supervisory Authority for approving retailing of WII

The requirements for marketing a new insurance product are specified in Article 3 of MoF Decree No. 422/ KMK.06/2003, which stipulates that a new insurance product, when submitted for registration to the regulator shall be accompanied by the following supporting documents:

a) Specimen of insurance policy;
b) Statement from insurance expert on the description and basis for the calculation of premium rate and technical provisions, along with supporting assumptions and data;
c) Underwriting projection for the next 3 years;
d) Reinsurance support for the insurance product;
e) Description of marketing technique and sample of brochure that will be used;
f) Legal agreement document if the insurance product is being marketed together with another party.

With specific reference to WII, the Feasibility Study team held various meetings with the head of the Insurance Bureau in order to understand the position of the regulator with respect to a potential implementation of WII contracts.
In principle, the Insurance Bureau did not foresee an obstacle to the development of index insurance in Indonesia. In order authorize the retail distribution of WII products, however, the Insurance Bureau needs to be provided with clear evidence that the product complies with the indications of the above-reference Ministerial decree.
In this respect, the Insurance Bureau emphasized that in order for WII to be granted authorization efforts must be made to address the following issues:

31 Axco, 2008.

- Specific attention should be devoted to the identification of the relationship between crop losses and the weather variable. The elaboration of the contract structure should be carried out by professionals with a recognized expertise in the field and should be based on scientifically sound methodologies.
- The pricing process should also be carried out according to standard actuarial practices and should result in the determination of an adequate premium level. In particular, the premium:
  - ✓ should be proportionate to the level of risk underwritten by the insurance company, avoiding placing the financial stability of the insurance company at risk and loading the policy holders with excessive burdens;
  - ✓ should not be discriminatory, in the sense that two covered parties within the same area of coverage and same risk exposure should be charged same rates;
- The policy holders should be educated about the functioning of the policies;
- Given the correlated nature of weather risk, and in order to preserve the financial stability of the insurance company, appropriate reinsurance backing should be demonstrated.

CHAPTER EIGHT

CONCLUSIONS

1. **The Feasibility Study identified maize production in Eastern Indonesia as an interesting case to demonstrate the potential application and value-added of WII in the agricultural supply chain.** In the study areas of East Lombok and South Sulawesi, irrigation infrastructure is lacking and drought is indeed the main and nearly exclusive risk for maize cultivation leading to potential crop failure. Due to the risky production conditions, farmers in these areas are unable to access financing from formal institutions, thus having to resort to costly informal financing, which leads to low investment input. In this respect, drought index insurance contracts could be a useful risk management option for maize production, especially when linked to package of inputs and financing for farmers.

2. **The Feasibility Study demonstrated that it is "technically feasible" to develop WII, and that there is a readily identifiable business model to support WII for maize production in the study areas.** Insurance can be particularly instrumental in unlocking credit for maize farmers if developed through a partnership between insurance companies and banks. In the cases examined, an initial estimation suggests that coupling WII with credit from formal financial institutions could reduce the cost of borrowing for farmers. Though promising, WII is not a panacea; while having access to insurance would mitigate weather risk and likely alleviate the concern of some banks about the risk of lending to farmers, other underlying inefficiencies in maize production and financing still remain, e.g., poor extension services, inadequate storage facilities, bad roads, persistent preference of banks for land as collateral. These inefficiencies are not addressed by WII. Promotion of WII, if complemented by other effective measures to deal with these chronic problems could help to improve the economic situation of Indonesia's farmers.

3. **Any final determination about whether WII products can be sold on a commercial basis to farmers should be made only after substantial test marketing of these products.** Technical feasibility is identified as the possibility of structuring a suitable WII contract while commercial feasibility is focused on determining if the product developed in the technical phase can be sold in such volumes that it makes commercial sense. In other words, can WII products be marketed successfully to farmers on a scale that allows the product provider to develop a sustainable line of business? To reach any definitive conclusion about commercial feasibility of WII, it would be necessary to go through a properly structured pilot test in which actual transactions between the parties involved (insurers, reinsurers, banks, and end-users) take place.

4. **Marketing of index insurance contracts requires the participation of willing and motivated insurance companies and/or financial institutions.** Though the seminars held with key players in the insurance and banking industries indicated general interest, no champion has yet demonstrated the requisite level of motivation and interest that would be necessary to carry the concept into implementation. International experience in the promotion of index insurance suggests that successful program development needs a strong driving force usually from the insurance industry, but also from other key players such as agricultural banks and agribusiness companies.

5. **It is important to note that from a research and development (R&D) point of view WII is very demanding, but the key trade-off is a simple administrative procedure, thus low recurring transaction costs which make insuring small farmers more manageable.** This need for upfront investment has three key implications. First, the potential application of WII and subsequent market development in a given context needs to be determined with a long-term view. Second, designing index insurance contract is simplest when weather risk is highly correlated, farm production homogeneous and weather risk management by other means more costly or ineffective. On the other hand, in an environment where farming systems and rural risk management are more complex, determining the value of a weather index insurance product also becomes more complicated, requiring an elevated level of intensive research work which is by nature linked to the need for intense data and meteorological infrastructure. These more complicated situations cloud the cost-benefit assessment for WII. Third, the demanding nature of R&D for

weather index insurance may require a special form of collaboration among insurance companies (such as an R&D pool) in the initial years of market development. In addition, some form of support from the Government and donors in the public good aspect of the R&D can be envisioned, such as the upgrade or expansion of network of weather stations, the creation of comprehensive crop yield data sets, the provision of initial technical expertise and subsequent capacity transfer, etc.

6. **WII may offer a promising approach to insuring maize production in Indonesia, but the instrument is likely to apply only to specific crops in specific areas. WII should not be considered a universal solution for lowering the risk of agricultural production across the whole country.** While Indonesia is extremely diverse in topography, crop production systems and patterns of weather risk, index insurance is most promising for slow-onset hazards (such as drought), and for annual rain-fed, field-scale crops (e.g. cereals, oilseeds, fiber crops) whereby the impact of the hazard is the loss of yield rather than quality. In addition, the range of index products available for agriculture in general is still relatively limited. The majority of weather index insurance products to date have been designed for rainfall risk; deficit or excessive rainfall, however, are not the only weather risks in Indonesia. In some regions, farm losses often result from a complex interaction of perils which also make weather index insurance less suitable, or have to be supplemented by other risk management measures. Given the nature of this insurance product, the key to successful program development therefore rests on the identification of suitable crops and production areas where a predominant weather risk can be identified and is suitable to the index approach.

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ANNEX 1

Analysis of weather and agricultural data for rainfall index insurance contract design

A1.1 Introduction

This Annex presents the background analysis on weather and agricultural data carried out for structuring the rainfall index contracts discussed in the Feasibility Study. The case study described is that of Pringgabaya, East Lombok, NTB.

A1.2 Climate and Weather Risk in Pringgabaya

Pringgabaya (East Lombok, NTB) is subject to typical tropical climate regimes, characterized by a single rainy season that spans across November to April and dry conditions during the rest of the year. Rainfall variability in Pringgabaya is analyzed by considering rainfall data collected from a weather station located at 116°37'39" W, 0.8°33'29"S, at about 140 meters above sea level. Data are collected by the National Weather Service of Indonesia (BMKG).

Annual Rainfall[32]

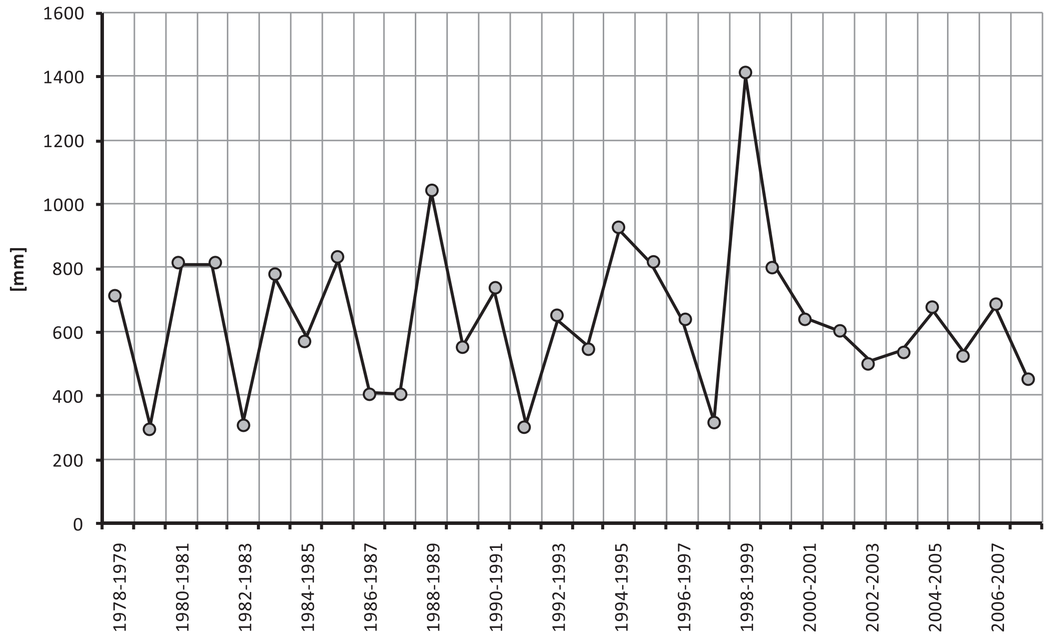
Annual rainfall is a useful first order indicator of major weather shocks, especially for drought events that are related – by definition – to the lack of sufficient rainfall during relatively long periods.

In Pringgabaya, the average annual rainfall is 640 mm with a standard deviation of 240 mm. The maximum annual rainfall in the records (1400 mm) occurred during the rainy season of 1998-1999. The minimum annual rainfall (304 mm) was observed in the 1979-1980 season (Figure A1.1).

Before the year 2000, values of the annual rainfall below 400 mm where regularly observed every 3 - 5 years. However, after the last event in 1997-1998, cumulated precipitation has not fallen below the mentioned threshold.

32 Throughout this Annex "annual rainfall" is defined as the total amount of rainfall cumulated during the period from October 1st of year Y to September 30th of year Y+1.

Figure A1.1 Annual rainfall in Pringgabaya.



Note: Annual rainfall is defined as the total amount of rainfall cumulated during the period from October 1st of year Y to September 30th of year Y+1.

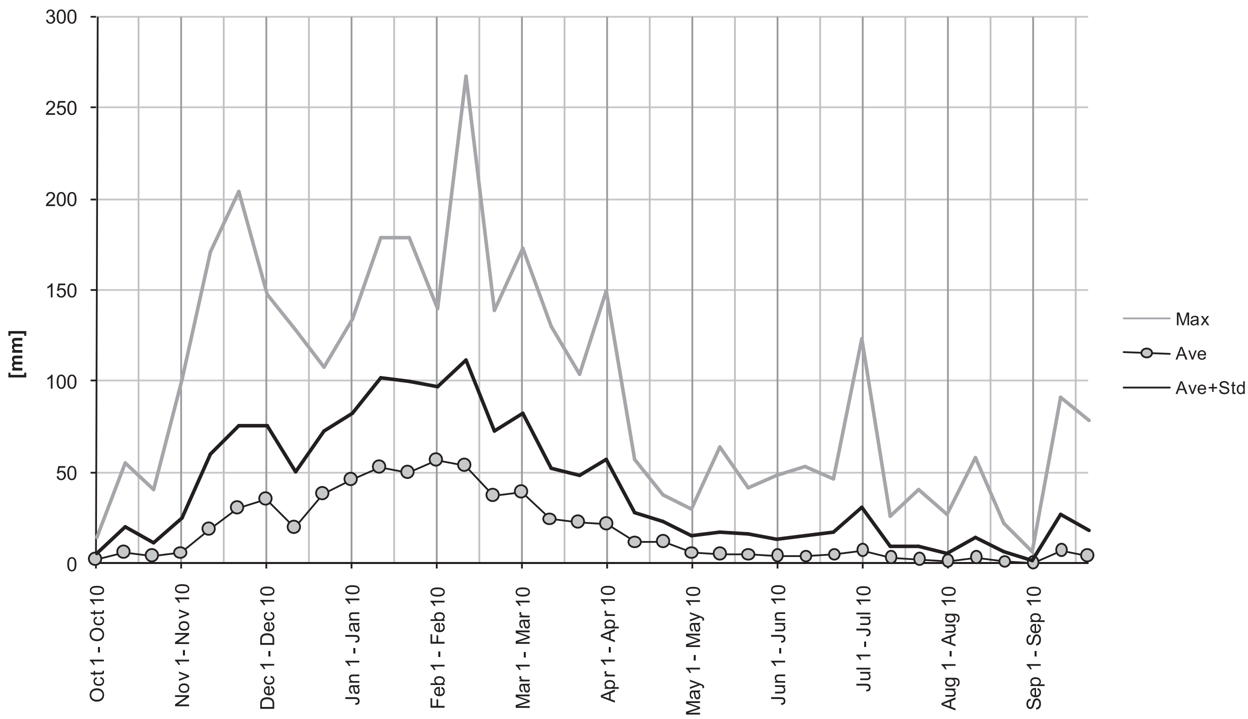
The large variability of annual rainfall together with rather low values of cumulated rainfall observed are already good indicators of the relevance of weather risk for crop cultivation in the area. However, a closer analysis of the seasonal cycle of rainfall can provide further insight.

Seasonal Cycle

The rainy season in Pringgabaya starts in November and reaches its maximum intensity by January-February. From May to October rainfall is erratic. The minimum amount of rainfall is usually observed during August and September (Figure A1.2).

The seasonal cycle described above is subject to significant inter-annual variability. For example, the average 10-day cumulated rainfall in January-February is about 50 mm, with a standard deviation of similar magnitude. Therefore, it is relatively easy to experience considerably wetter or considerably drier conditions during this time of the year. it is worth noting that January-February roughly corresponds to the flowering phase of most crops in the area.

Figure A1.2 Rainfall seasonal cycle recorded at Pringgabaya.



Note: Grey dots represent the average 10-day cumulated rainfall. The solid black line represents one standard deviation of the 10-day cumulated rainfall from the average. The solid grey line is the maximum observed ten-day cumulated rainfall.

A similar relation between the average 10-day cumulated rainfall and its standard-deviation holds for the onset of the rainy season in November-December. The onset of the rainy season is usually defined as the 10-day period during which cumulated rainfall amounts to at least 25mm. Using this definition, the average onset of the rainy season normally occurs at the last dekad of November. However, significant deviations from the average may occur.

A few examples of the discussed inter-annual rainfall variability are reported in Figure A1.3.

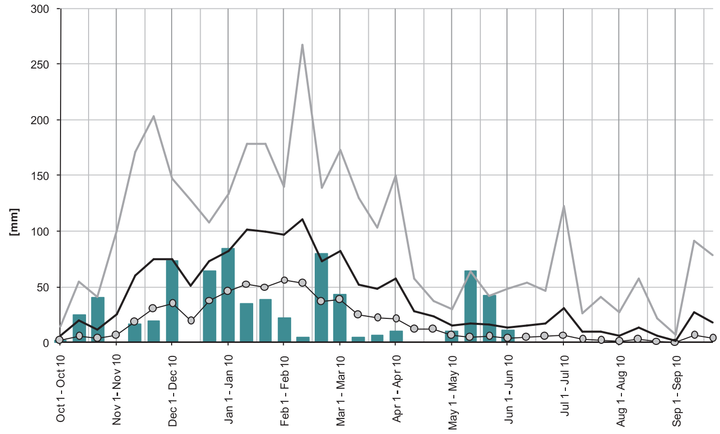
During **1978-1979** (Figure A1.3a) the rainy season set in very early, with 25 mm of rainfall during the second dekad of October. Instead, during the following year (**1979-1980**, Figure A1.3b) there was no rainfall until the beginning of January. In particular, the latter crop season was the driest in the record for Pringgabaya, with a few consecutive dekads of no rain during February and during March-April.

On the opposite end, the 10-day cumulated rainfall was often above the average during the crop season **1998-1999** (Figure A1.3c) and a couple of the maximum values were recorded during this year.

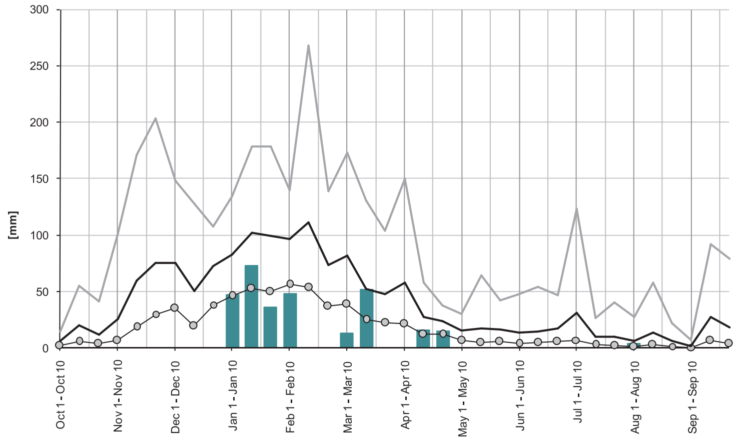
The examples discussed above indicate that:

1. The large variability of annual rainfall can be a severe constraint for crop production in the area;
2. Inter-annual variability of rainfall distribution within the rainy season can affect specific phases of the crop cycle. In particular the variability of 10-day cumulated rainfall is rather large during the flowering phase of most crops in the area.

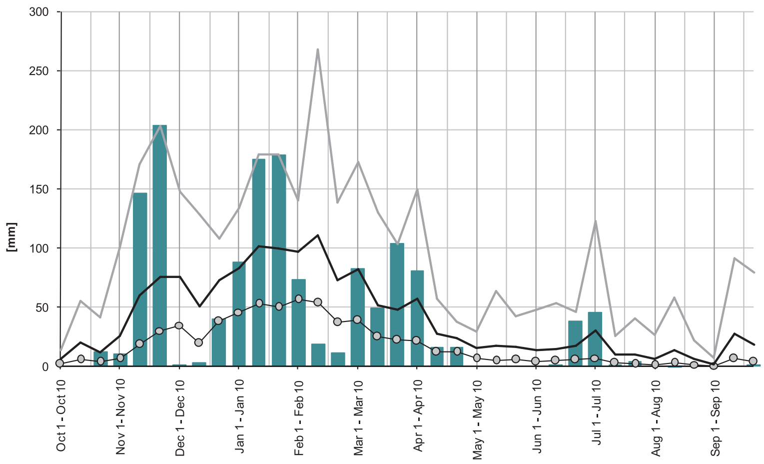
Figure A1.3: 10-day cumulated rainfall in Pringgabaya in selected crop seasons



(a) 1978 - 79



(b) 1979 - 80



(c) 1998 - 99

Note: The blue bars represent the 10-day cumulated rainfall. Grey dots represent the average 10-day cumulated rainfall. The solid black line represents one standard deviation of the 10-day cumulated rainfall from the average. The solid grey line is the maximum observed ten-day cumulated rainfall.

A1.3 Information on agricultural productivity and cultivation practices in Pringgabaya

In designing a weather index contract for agricultural production risk it is necessary to access information related to the specific agricultural production process together with historical data on crop productivity.

Agronomic information is needed to understand the impact of the risk variable on the different stages of crop life, while historical yield data is used to determine the performance of the contract over a number of past observations.

A summarized description of the most relevant elements of maize cultivation in the Pringgabaya area is presented in Box A1.1.

BOX A1.1: Maize cultivation in Pringgabaya, East Lombok (NTB)

Calendar and production activities

Given the seasonal rainfall distribution of Pringgabaya, only one maize crop per year is carried out in the area. Production activity begins in October with land preparation and planting takes place in late November – early December after rainfall provides a sufficient level of soil moisture (two or three light rains or one more significant precipitation event).

Farmers use both local composite and hybrid varieties with growing cycles of, respectively, 90 – 100 days and 115 – 120 days. Hybrid varieties seem to be the most frequently adopted.

Crops are usually fertilized and weeding is a relevant part of the production process. The crop is harvested manually.

In a good crop year production can reach 3.5 tons/ha but total loss of crop can also be experienced.

Input costs and price of maize

Input costs (without labor) are about IDR 2 million. The cost of drying the grain is approximately IDR 6,000 – 7,000 per quintal.

Maize is normally sold at IDR 120,000 – 150,000 per quintal.

Risks

The main production risk is represented by drought while pests and disease seem not to be a relevant threat to maize production in this area.

According to maize producers, flowering is the growth stage that is most sensitive to drought. If dry spells of 3 to 5 weeks are experienced around this growth stage the crop is likely to fail.

Since yield data of appropriate quality and dis-aggregation (farm-level data) is not always accessible, the Agricultural Risk Management Team (ARMT) of the World Bank has developed a contract design methodology based on the generation of synthetic (modelled) yield series for the crop under study. This methodology has been adopted in an extended number of transactions around the world.

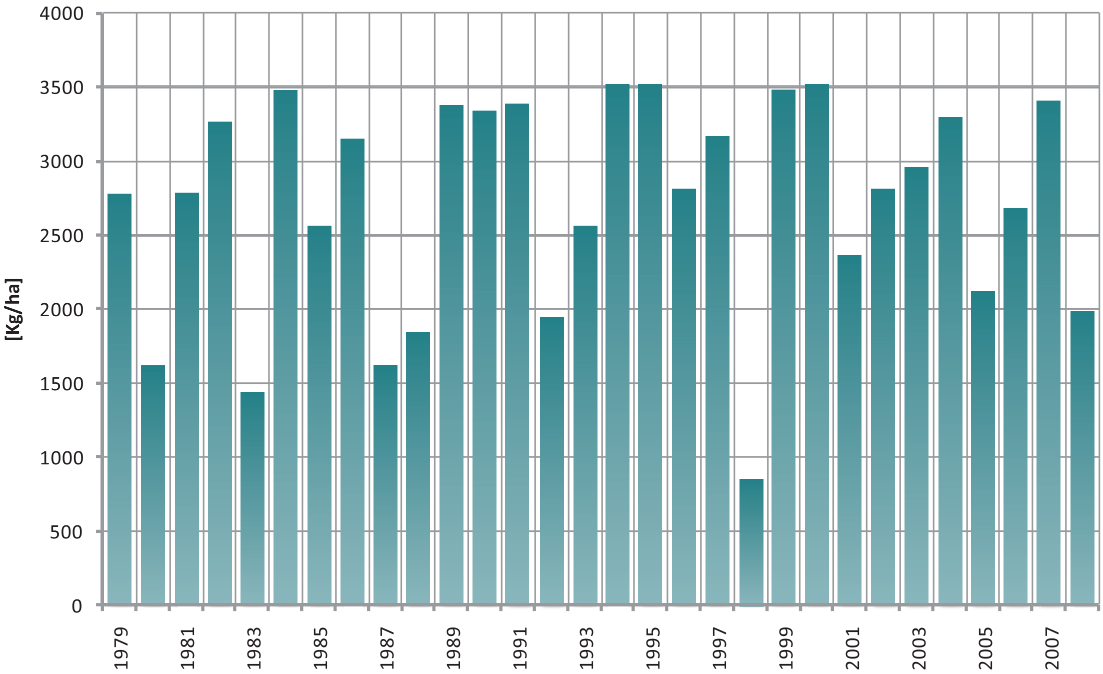
The methodology is based upon the Water Requirement Satisfaction Index (WRSI) developed by the Food and Agriculture Organization (FAO) of the United Nations and used in most of the Early Warning Systems that monitor plant growth as an indicator of potential food crisis. This method takes into account the distribution of rainfall occurring during the season, and the water stress affecting plant development.

The WRSI approach is particularly useful in structuring index contracts that cover against drought events. The water balance index captures yield reductions generated by lack of water availability that, in rainfed agriculture, are mainly driven by insufficient precipitation and/or excessive evapo-transpiration.

The fact that the WRSI approach does not account for other sources of yield reduction (e.g. pests and diseases) is very useful when analyzing the impact of reduced precipitation on crop yield. Where other risks are more important to the final yield, the WRSI approach can be valuable in determining the yield variation expected from rainfall alone. More details on WRSI are provided in Box A1.2.

Figure A1.4 presents the synthetic yield series of the last 30 years for the Pringgabaya area generated with the WRSI methodology. The picture shows that, given rainfall availability, in some years the yield potential has been expressed in full, reaching the optimal production level, while in other years yield has suffered different degrees of reduction.

Figure A1.4 WRSI estimated maize yield in Pringgabaya.



Box A1.2 The WRSI approach to weather risk assessment

The Water Requirement Satisfaction Index (**WRSI**) measures crop performance based on the balance between water supply and demand during the growing season. Usually, the computation of the water balance is updated with a frequency of **ten days**. During each ten-day period, the WRSI is computed as the ratio between evapo-transpiration[33] and the water requirement of the crop.[34]

If we define AET as "Actual Evapo-transpiration" – a function of water availability in the soil - and WR as "Water Requirement" – a function of atmospheric conditions and plant growth phases, WRSI is determined by the following relationship:

$$WRSI(i) = 100*AET(i)/WR(i)$$

The underlying conceptual scheme is that of a bucket which is replenished by rainfall and depleted by evapo-transpiration. A critical step in the computation of WRSI is in the update of the soil water content. If during a given ten-day period the sum of soil water content plus the cumulated rainfall is less than the plant water requirement, then a water deficit is recorded. In more specific terms, if AET is less than the WR determined by atmospheric conditions and by the plant's growing phase, the plant suffers a determined level of water stress. Conversely, if the sum of soil water content plus the cumulated rainfall exceeds the plant water requirement there is no water deficit

The WR can be calculated by adjusting the "Potential evapo-transpiration" by the specific characteristics of the plant at a given growing phase. It is computed as follows:

$$WR(i) = PET(i) * Kc(i),$$

where i indicates the ten-day period, PET is the Potential evapo-transpiration during the considered period and Kc is a crop coefficient, which depends not only on the crop in object but also on the particular growing phase of such crop.

PET (also known as "ETo" in FAO terminology) can be defined as the evapo-transpiration rate from a reference surface (a hypothetical grass reference crop with specific characteristics), not short of water,[35] and is a function of local weather parameters, such as solar radiation, air temperature, wind speed, and humidity. As PET depends mainly on solar radiation, which is a fundamentally an astronomical parameter, climatological tables for this parameter are usually considered as representative of the actual value.

33 FAO documentation defines Evapotranspiration (ET) as the combination of two separate processes whereby water is lost from the soil surface by evaporation and from the crop by transpiration (http://www.fao.org/docrep/x0490E/x0490e04.htm#evapotranspiration%20(et)).

34 Kc crop values are available in table 12 of the FAO Irrigation and Drainage paper no. 56 (http://www.fao.org/docrep/X0490E/X0490E00.htm).

35 http://www.fao.org/docrep/X0490E/x0490e04.htm#reference%20crop%20evapotranspiration%20(eto)

ANNEX 2

FARMERS' FOCUS GROUP QUESTIONNAIRE FOR COLLECTING CONTRACT DESIGN INFORMATION

INFORMATION FOR DROUGHT COVERAGE FOR MAIZE

General information

Date:
Location:
Country:
Crop:
Type of coverage:
Other information:

Production

1. What variety of maize is the most common in the area?
2. What is the average farm size for maize farmers?
3. What is the typical planting period for maize (month/ week)?
4. What is the earliest date that maize can be planted?
5. What is the last date when maize can be successfully planted (month/ week)?
6. Can you provide more details on the crop calendar of maize, highlighting the main plant growth phases?

<table>
<tr><th>Phisiological phases</th><th>WRSI phases</th><th>Period (approx date of phase beginning)</th><th>Lenght of period (days)</th></tr>
<tr><td>-</td><td rowspan="3">Planting and establishment</td><td rowspan="3"></td><td></td></tr>
<tr><td>Germination</td><td></td></tr>
<tr><td>Leaf development</td><td></td></tr>
<tr><td>Stem elongation</td><td>Vegetative</td><td></td><td></td></tr>
<tr><td>Inflorescence emerging, heading</td><td rowspan="2">Flowering</td><td rowspan="2"></td><td rowspan="2"></td></tr>
<tr><td>Flowering, anthesis</td></tr>
<tr><td>Development of fruit</td><td rowspan="2">Maturation</td><td></td><td rowspan="2"></td></tr>
<tr><td>Ripening</td><td></td></tr>
</table>

7. Is maize production in this area rain-fed or irrigated (if both indicate relative proportion)?
8. What is the average cost of production in the area? Total costs of inputs per hectare (or other area unit, if different specify); specify if it includes labor costs and/or land rent
9. What types of fertilizers or inputs are used by maize growers? When are they applied during the season? What are the specific costs of these inputs per hectare?

Items	Type	Amount (lts, kg/ hectare)	Value	
(IDR)	Month inputs applied			
Seed				
Fertilizer				
Chemicals (specify)				
Other				

10. What is the optimal yield in the area?
11. What is the average yield in the area?
12. Which years in the last ten to twenty years do you recall having the best yields?

YEAR	SIZE OF LAND	YIELD	Notes

13. Which years in the last ten to twenty years do recall having the worst yield?

YEAR	SIZE OF LAND	YIELD	Notes

Income

1. Do farmers in the area have alternative sources of income? What percentage of farmers relies only on farm income?
2. How relevant are maize revenues for households' incomes in the area?
3. Is maize produced for commercial purposes or for self-consumption?
4. What are the main sales markets for maize?
5. On average what are the prices for maize? Recent years high vs. low.
6. Is there any forward contracting for maize?
7. During which month do most farmers normally sell their production?

Risk

1. What are the main risks for farmers' income?

2. What are the primary production risks?

a. Pests?	
b. Diseases?	
c. Weather?	
d. Lack of access to inputs?	
e. Other?	

3. What are the specific weather risks that production faces?

a. Drought?	
b. Excess Rain?	
c. Temperature?	
d. Other?	

4. If farmers are exposed to weather risks, how do they currently manage them?

5. In how many years out of ten, yields are reduced because of drought?

6. Which years in the last ten do you recall having the most favorable weather for production?

YEAR	SIZE OF LAND	YIELD

7. Which years in the last ten do recall having the worst weather for production?

YEAR	SIZE OF LAND	YIELD	Why?

Rainfall Contract Parameters (if drought or excessive rain risks apply)

1. Do farmers in the area practice dry planting or do they wait for onset of rainfall?
2. How do farmers judge when rain is sufficient for planting?
3. What do they do if rains are insufficient for planting? Plant a different crop vs plant anyway? Do they ever not plant if rainfall is not good?

4. a - Which periods in the growing season are the most critical to have rainfall for a successful harvest?

Planting	Establishment (Germination & Leaf Dev)	Vegetative (Stem elongation)	Flowering	Maturation

KEY: Not important, somewhat important, very important, and critical

4. b - Are there periods during the growing season where too much rain has destroyed or damaged the harvest?

Planting	Establishment (Germination & Leaf Dev)	Vegetative (Stem elongation)	Flowering	Maturation

KEY: Not important, somewhat important, very important, and critical

5. a- In the drought years, at which growth stage/s was the crop most affected?
   b - In the excess rainfall years, at which growth stage/s was the crop most affected?

WRSI phases	Year	Year	Year	Year
Planting and establishment				
Vegetative				
Flowering				
Maturation				

6. Does rainfall at XXXX station reflect the rainfall pattern of the area? Do parts of the area have different rainfall patterns?

Access to Finance

1. How do farmers normally finance input costs?

Do not buy inputs	Own finances	Loan from Banks	Money Lenders	Other sources	Interested in Financing but no access

2. What type of financing? What are the terms?
3. What time of year is the financing received? What time of year is financing needed?
   March
4. What types of collateral do they normally provide?
5. Which months are they expected to pay back loans?
6. Would having access to some form of insurance improve farmers' access to credit?
7. Have there been experiences with rescheduling and/or default? If so, when and why?

ANNEX 3

Review of the Indonesian Insurance Sector[36]

A3.1 General Background

Insurance has a long history in Indonesia. Asuransi Jiwasraya was founded by the Dutch in 1859, and Asuransi Jiwa Bersama Bumiputera was created as a mutual insurer in 1912 by Indonesian teachers. At independence in 1945, the vast majority of the Indonesian insurance market was controlled by foreign-owned insurance companies. However, following a number of closures and nationalizations, by 1985 the market was dominated by state or quasi-state companies.

Historically, capital requirements for companies were lax and licensing requirements were loose. The industry was sheltered from international competition, and there was significant state involvement in traditional insurance markets. This has resulted in a larger number of industry participants, but the relative aggregate size of the industry is small in relation to other countries. According to AXCO statistics, in 2006 Indonesia was the 41st insurance market in the world, just behind Chile and above Hungary. The non-life market ranked 44th in the world and the life market ranked 35th. (AXCO 2008)

Given the overcrowded and undercapitalized insurance market, the authorities have introduced a minimum basic capital requirement for all insurance companies.[37] It is expected that this measure will cause a degree of consolidation to occur in the market, since a significant proportion of companies have capital lower than the proposed new minimum requirements.

Many domestic companies are either owned by or have links with banks and large business organizations. The international joint venture companies also have strategic links with banks, domestic insurance companies and conglomerates. A particular feature of the Indonesian insurance market is the involvement of domestic insurance companies, in separate operations, as shareholders of joint venture companies. This does not necessarily lead to the development of synergy between joint ventures and the domestic insurance companies, however, as they often operate in different segments of the market with very different business philosophies and strategies.

A3.2 Market Structure

Reflecting the small but highly fragmented industry, as of December 2004 there were 162 insurance companies in Indonesia, comprising 57 life insurers, 101 non-life insurers, and four reinsurance firms (see table A3.1). Life, non-life, and reinsurance assets amounted to Rp 44.9 trillion, Rp 19.2 trillion, and Rp 953 billion, respectively, totaling Rp 65 trillion (US$7.3 billion, or 2.9 percent of GDP). In 2005, the total number of registered insurers in the market was down to 157; there were 97 non-life insurers left in the market, of which 16 companies were operated according to Sharia principles. In 2006, a further three non-life companies withdrew from the market.

36 This review is taken from the World Bank report “Unlocking Indonesia’s Domestic Financial Resources: The Role of Non-Bank Financial Institutions” (World Bank 2006), and the 2008 Axco Insurance Market Report (AXCO 2008).

37 See Chapter 8 for more details.

Table A3.1: Ownership Structure of the Insurance Industry, 1985 and 2005

	Life companies		Non - life companies		Reinsurance	
Indicator	**1985**	**2005**	**1985**	**2005**	**1985**	**2005**
Number of companies	21	51	67	97	4	4
Percent of total assets State						
State	41	7	61a	14	99	-
Joint venture	-	49	14	16	-	-
Private	59b	44b	25	71	-	100
Top five companies	93	53	64	43	100	100
Assets (Rp billion)	409	53,940	512	21,206	263	978

Source: World Bank (2006) based on data from Cole & Slade (1996) and Bapepam & LK

Domestic companies (including state-owned) dominated the market in 2004 with a 78.9% share of direct non-life business. The joint venture companies' share of the direct insurance market was 21.1% in 2004. Jasa Indonesia (state-owned) and Tugu Pratama Indonesia (of which Pertamina, the state-owned energy company, is a major shareholder) are leading players in most classes of business in particular property, energy, aviation, marine hull and engineering, with non-life market shares of 13.0% and 7.6% respectively. The following table shows some of the leading groupings in the market.

Table A3.2: Leading Groupings in the Indonesian Insurance Market.

Insurance company	**Business associations**
Lippo Genenal	Lippo Group including AIG Lippo Life, Aon Lippo and Lippo Utama Life
Tugu Pratama	Pertamina (state oil company), Tugu Mandiri Life and Bank Mandiri
Astra Buana	Astra International Group which includes Astra CMG Life
Sinar Mas	Sinar Mas industrial group
Asuransi Umum Bumiputeramuda 1967	Bank Bumiputera and Bumiputera 1912, the largest life company
Central Asia	Bank Central Asia and Central Asia Raya Life
AIU	American International Group
Allianz Utama	Asuransi Jasa Indonesia, Asuransi Wuwungan
Cigna Insurance	Bank Niaga
Asuransi Permata Nipponkoa	Bank Permata

Source: AXCO (2008)

Despite the constantly changing number of market participants, the Indonesian Insurance Industry has been growing steadily since 1999. Over the period 2000–5, assets and premiums in the life sector almost tripled. In the non-life sector, assets increased by around 75 percent, while premiums increased by around 90 percent.

Table A3.3: Growth of the Insurance Industry, 2000–5 (Rp trillion)

Indicator	2000	2001	2002	2003	2004	2005
Life insurance companies						
Total assets	18.7	22.4	26.3	32.9	44.9	53.9
Total investments	14.2	17.3	20.4	26.6	36.4	45.4
Net premiums	7.0	9.1	11.2	13.7	18.3	21.6
Investment yields	2.1	1.8	1.0	2.0	3.8	3.7
Claims and benefits paid	(4.2)	(5.2)	(5.5)	(6.5)	(8.7)	(11.2)
Increase in premium reserves	(2.9)	(2.5)	(2.9)	(4.5)	(7.6)	(8.3)
Total costs	(2.2)	(3.1)	(3.6)	(4.1)	(4.4)	(2.5)
Net income	(0.1)	0.0	0.2	0.5	1.0	1.2
Percent of net premiums	-2.1	0.5	1.5	3.4	5.5	5.6%
Return on investments	14.8%	10.3%	4.7%	7.4%	10.5%	8.2%
Total cost as % of benefits	53.4%	58.9%	65.4%	63.6%	50.3%	22.0%
Non-life insurance and reinsurance companies						
Total assets	12.6	14.8	15.8	17.2	20.2	22.1
Total investments	8.2	9.4	10.0	11.4	13.7	14.8
Gross premiums	7.0	10.0	11.9	12.7	14.3	15.9
Premiums paid	(2.9)	(3.7)	(4.6)	(5.2)	(6.0)	(8.3)
Net premiums	4.0	6.3	7.3	7.5	8.3	7.7
Investment yields	0.8	0.9	0.5	0.8	1.2	0.9
Claims and benefits paid	(3.6)	(5.8)	(6.0)	(5.5)	(5.2)	(7.6)
Claims and benefits received	2.3	4.0	3.8	3.1	2.4	3.9
Net claims and benefits paid	(1.3)	(1.8)	(2.2)	(2.4)	(2.8)	(3.8)
Total costs	(1.3)	(1.5)	(1.7)	(2.0)	(2.1)	(2.4)
Net income	0.9	1.1	0.9	1.2	1.7	1.5
Percent of net premiums	23.3	17.0	11.9	16.0	20.2	20.0%
Return on investments	10.3%	9.3%	4.7%	6.9%	8.6%	6.1%
Total cost as % of benefits	36.1%	26.6%	27.9%	35.9%	39.7%	31.1%

Source: World Bank (2006) based on Annual Reports from Bureau of Insurance, Bapepam & LK

A3.3 Penetration

Insurance penetration in Indonesia --premiums as a percent of GDP—is low, with premiums equal to 1.4 percent of GDP in 2005 (life, 0.8 percent; non-life 0.6 percent, see table A3.4). Penetration takes into account the capacity to pay, and there is a strong correlation between the level of income per capita and the portion spent on insurance. Penetration varies from 9.0 percent (life, 5.1 percent) for OECD countries to about 3.4 percent (life, 2.2 percent) for the ASEAN countries. It is therefore not surprising that penetration in Indonesia, where income per capita is low, is also low. Other factors including education level, religion and cultural practices, availability of other risk coping mechanisms and strategies, and the quality of institutions might also account for the low insurance penetration in the country.

Table A3.4: Insurance Penetration in Selected Countries, 2003/2005 (USD unless otherwise indicated)

	Total insurance premiums		Life premiums		Non-Life premiums	
Country	**Amount (billion)**	**% of GDP**	**Amount (billion)**	**% of GDP**	**Amount (billion)**	**% of GDP**
Indonesia 2005	3.8	1.4	2.2	0.8	1.6	0.6
Indonesia 2003	3.1	1.2	1.4	0.6	1.7	0.6
Malaysia	5.6	5.4	3.5	3.3	2.2	2.1
Philipines	1.2	1.5	0.7	0.9	0.5	0.6
Thailand	4.9	3.5	3.2	2.3	1.7	1.2
Australia	40.4	8.0	22.3	4.4	18.1	3.6
Canada	59.2	6.8	22.8	2.6	36.3	4.2
Japan	479.1	10.8	381.3	8.6	97.7	2.2
ASEAN	24.3	3.4	14.6	2.2	9.6	1.2
OECD	2,709.8	9.0	1,533.2	5.1	1,176.6	3.9

Source: World Bank (2006) based on data from Bapepam & LK, Swiss RE, OECD for data regarding other countries.[38]

A3.4 Distribution Channels

In the past insurance companies reached out to clients by establishing branch offices, but this is an expensive form of distribution. Today, agents dominate the distribution system outside Jakarta, but brokers are involved in many of the larger accounts. *Decree No 425/KMK.06/2003* now requires the registration of agents and they are being encouraged to attain certain professional standards, by examination, before being authorized to solicit business. The process of registration of agents and training of staff is proving to be very slow, especially outside Jakarta. In the major centers such as Jakarta, insurers are seeking to develop business through call centers and through bancassurance, as many have links with banks through shareholdings.

Bancassurance has had limited impact in the non-life sector, although banks are often appointed as insurance agents. *Article 10b of the Banking Law 10/1998* prohibits banks from carrying insurance risk, but they are allowed to sell insurance products and to hold investments in insurance companies. *Decree No 426/KMK.06/2003* permits insurance companies to market through banks, but requires them to be fully responsible for the actions of the banks in relation to insurance transactions. Motor insurance is sold through bancassurance schemes with a fair degree of success. Some of the major insurance company/bank relationships are presented in Table A3.5.

38 The comparisons are made using aggregate or regional averages, but comparisons that are more specific focus on six countries: three developing economies that can be seen as a short-term benchmark and three developed economies that illustrate the longer-term potential. The three developing economies are Malaysia, the Philippines, and Thailand. For the developed economies, Australia is a close neighbor in the region, Japan is a developed Asian economy, and Canada represents a North American economy. Indonesia is a civil code country, and Canada has a legal system that combines the civil code in Quebec with the common law in other provinces; its legislation has inspired some of Indonesia's pension and insurance legislation.

Table A3.5: Major Insurance Companies-Bank Relationships

Insurance company	Bank
Asuransi Bina Grya Upakara	Bank Tabungan Negara
Asuransi Staco Jasapratama	Bank Mandiri
Asuransi Astra Buana	Bank Permata
Asuransi Central Asia	Bank Central Asia
Aviva	Standard Chartered Bank
Asuransi Bancbali Nippon Fire	Bank Permata
Asuransi Adira Dinamika	Bank Danamon
Bumiputera Muda 1967	Bank Bumiputera
Lippo General Insurance	Lippo Bank
Panin Insurance	Panin Bank
Asuransi Multi Atra Guna	Panin Bank
Mega Insurance	Bank Mega
Asuransi Sinar Mas	Bank International Indonesia

Source: AXCO 2008, p.66

ANNEX 4

Structure of Prominent Agriculture Credit Institutions[39]

Bank Mandiri

Bank Mandiri is Indonesia's largest bank, with IDR 340 trillion (US$ 34 billion) in assets at end of December 2008. It was created on 2 October 1998 as part of the Government of Indonesia's bank restructuring program whereby four state-owned banks, namely Bank Bumi Daya, Bank Dagang Negara, Bank Exim and Bapindo were merged into Bank Mandiri. Immediately following the merger, Bank Mandiri embarked on a comprehensive process of consolidation. Most visibly, they closed 194 overlapping branches and reduced their combined workforce from 26,600 to 17,620. Mandiri's corporate customer base still represents the core of the Indonesia economy. By sector, it is well diversified and particularly active in food and beverage manufacturing, agriculture, construction, chemicals and textiles.
Since June 2006, the Bank Mandiri organizational structure has changed. The functions of its units were divided into three major groups which are:

1) Business Units, responsible as the Bank's main business development engine, consist of 6 directorates which are Corporate Banking, Commercial Banking, Consumer Finance, Micro and Retail Banking, Treasury and International banking and Special Assets Management.
2) Corporate Centers, responsible to handle strategic corporate and support the bank's policies consist of three directorates which are Risk Management, Compliance and Human Capital, and Finance and Strategy.
3) Shared Services, functioning as a support unit to the bank's operations activities as the whole which are handled by Technology and Operations directorate.

Head Quartered in Jakarta, currently Bank Mandiri has more than 21 thousand employees spread among 1000 offices. The following are detailed domestic and off-shore structure:

Domestic Regional Offices	10
Domestic Branches:	
Area	59
Community branches	118
Branch	359
Cash outlets	491

Bank Rakyat Indonesia

Bank Rakyat Indonesia (BRI) is the oldest commercial bank in Indonesia and Indonesia's leading commercial microfinance bank. Its history began back on 16 December 1895 when Raden Bei Aria Wiriadmaja founded a small financial institution with the name of De Poerwokertosche Hulp en Spaarbank der Inlandsche Hoofden. The institution managed the mosque's fund, which was then made available for the people in the vicinity with an easy repayment scheme. Over the years, the institution went through name changes and evolved with the surrounding condition. And finally in 1992, the official name of the institution became PT Bank Rakyat Indonesia (Persero), being one of the state-owned enterprises. In 2003, the Government of Indonesia decided to sell off 30% of its share in the Bank and the Bank became entirely private.

39 This review is taken from Bank Mandiri and Bank BNI's annual report 2008, and Ministry of Cooperative and SME's websites: www.depkop.go.id

BRI vision is to be the leading commercial bank that always prioritizes customer satisfaction. Its business focus and the characteristic that remains unchanged since its conception is to provide assistance to micro, small and medium enterprises (MSMEs). The commitment is reflected in the allocation of loans for the sectors that affect the livelihood of the population and other financial services that the Bank offers to the community.

BRI business lines consist of full range of saving and loans product including micro, small and medium loans. Over the years, BRI has been successful at profitably serving rural enterprises and is viewed as one of the most successful SME lenders in the world. 20%-30% of its microloans are in Agriculture and all its Agriculture loans are individual microloans. The bank does this type of lending through its highly profitable Unit Desa System. The unit operates at the sub-district level under supervision of BRI branches at the district level, but they are separate profit centers with their own financial statements. The unit's financial operations are included in the financial statement of BRI.

BRI doesn't have a specific commodity focus and its loans do not target crop production; instead the bank lends to the overall cash flow of the borrowers which stems from both on-farm and off-farm incomes. In term of financial services, BRI provides a full range of financial services including money transfer, trade finance and remittances, treasury, investment banking, bancassurance, and point of sales. These products and services provided through its network offices and are connected online by BRINET. Currently, BRI has 4,547 offices including Unit Desa and 2 overseas representative offices serving 25 million customers (savings and loans). In 2008, Bank Rakyat reported a strong profit of IDR 5.9 trillion (US$590 million), up 23% from 2007.

Bank Perkreditan Rakyat

Bank Perkreditan Rakyat (BPRs), are the second largest providers of microfinance after Bank Rakyat Indonesia (BRI). These BPRs are well placed to serve micro enterprises and underserved households due to their wide geographic coverage and proximity to clients. Bank Indonesia reports that the total loan portfolio of the country's 1,746 BPRs was worth nearly IDR 28 billion (US$2.8 million) in November 2008, and they serve some 2.8 million borrowers. Around 7.8 million people save more than IDR 25 billion (US$2.5 million) in BPRs. Despite these promising figures, some BPRs serve only 28% of the households that are borrowing. Also due to their size (most of them are small) and the regulatory framework governing them, BPRs are prevented from functioning as fully-fledged financial institutions.

Koperasi Unit Desa (KUD)

KUD, the Agricultural cooperative in Indonesia accounts for 30% of the cooperative sector's assets. Excluding BPR's cooperatives, at end of December 2000 KUD had the largest total assets (IDR 433 billion) and number of members (3,157,727) of all types of cooperatives. The average amount of assets per member was IDR 300 thousands. KUD does not manage a large amount of savings, so it relies heavily on borrowing from commercial banks for fund raising when it provides loans to members. The cost of fund is high enough to discourage KUD to perform a more aggressive role in agriculture credit market.

Indonesia Stock Exchange
Building Tower 2, 9th Floor,
JL. Jend Sudirman Kav. 52-53
Jakarta 12190 Indonesia

T: + 62 (21) 2994 8001
F: +62 (21) 2994 8002
www.IFC.org/indonesia

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