

Index-based insurance: An adaptation to climate change induced risks in cocoa production in Ghana

Introduction: Cocoa serves as the main source of employment and income for Ghanaian cocoa farmers (Ntiamoah and Afrane 2008). Meanwhile, cocoa production in Ghana is still rain-fed as farmers produce cocoa mostly on a small-scale basis and therefore lack the needed resources to provide irrigation and other inputs (Aneani et al. 2011). However, optimum amounts of rainfall and temperature are crucial for a good yield. These climatic variables are high-risk factors during the fruiting and growing stages of cocoa (ICCO 2013). This means that any variation in rainfall patterns, extreme temperatures or droughts during the key stages of growth can put cocoa farmers at risk of crop failure (Mason et al. 2016). According to recent projections of extreme temperatures and rainfall reduction, cocoa suitability in Ghana will reduce between 2030 and 2050 (Laderach et al. 2011; Laderach et al. 2013). Since cocoa heavily depends on climate factors, these forecasts must be addressed in time to avoid any unpleasant surprises. Even though the changes are expected to be gradual, leaving time for adaptation, they can still threaten sustainable cocoa production if completely neglected (ICCO 2013; Laderach et al. 2013). The recent emission reduction implementation strategy for Ghana recommends the use of insurance as a tool to reduce the risk of climate change induced cocoa yield losses (Mason et al. 2016). Index-based weather insurance (index insurance) is a tool that can help smallholder farmers to better adapt to climate change and provide financial security in times of yield losses associated with weather deviations. Unlike indemnity insurance, where payouts are based on a client’s measured loss, index insurance allows payout based on a predetermined index threshold, e.g. rainfall level or average yield loss of an area (Greatrex et al. 2015). It is a measure that has the potential to improve cocoa farmers’ resilience and enhance their adaptability to the risks posed by a changing climate (Greatrex et al. 2015). However, cocoa farmers’ willingness to pay (WTP) and the factors that can influence their WTP for index insurance are unknown. In addition, the complex nature of the cocoa sector and the weak organisational structure of Ghanaian cocoa farmers create uncertainty about the adoption and successful implementation of index insurance. This master thesis aimed to build on existing information on factors influencing farmers’ WTP for index insurance. It highlighted organisational and institutional factors that can influence demand and provision of index insurance in two of the main cocoa growing areas of Ghana – the Dormaa West and Bia East districts.

Materials and methods: The study employed both qualitative and quantitative research methods to determine the factors that can influence farmers’ WTP and insurance companies’ willingness-to-provide as well as institutions’ perception on adoption and implementation of index insurance. First, a stakeholder analysis was conducted to help identify the key actors to include in the study. This was followed by two focus group discussions (FGDs) with opinion leaders and influential people from each district to determine WTP for index insurance at the district level. Responses from the FGDs were used as a baseline for household interviews with 313 households in 20 communities in the Dormaa West and Bia East districts. This was in the form of a structured questionnaire in a face-to-face interview to determine farmers’ WTP for index insurance. In addition, interviews were conducted with representatives of five insurance companies to determine their interest in and potential challenges associated with designing an index insurance policy for cocoa farmers. Key informant interviews were conducted with representatives of the Ghana Cocoa Board (COCOBOD), Cocoa Research Institute of Ghana and Bonsu Cocoa College to determine the factors that can affect adoption of index insurance from an institutional perspective.

Results and discussion: The findings of the study were that about 91% of farmers have observed or experienced changes in rainfall patterns, extreme sunshine/temperatures and droughts and more than half of them expect an ongoing occurrence of such extreme events. They reported severe impacts of the changes including low yield, income reduction and in some cases death of cocoa trees. Owing to this, the vast majority of cocoa farmers (93%) were willing to pay for index insurance and more than half of them were willing to pay about 10% of their yield or more as insurance premium. In other studies, socioeconomic and farm characteristics of respondents have been used to explain WTP for index insurance (Akhter 2013; Ćurak et al. 2013; Aidoo et al. 2014; Danso-Abbeam et al. 2014; Okoffo et al. 2016). In this thesis, over 90% of the respondents were willing to pay for index insurance. This makes it difficult to explain WTP with their demographic characteristics which were in most cases not significant in the multiple logistic regression model. Inferring from my personal observation as a Ghanaian, together with a few of the key informant interviews conducted, farmers are curious and are most likely to try any new intervention with the idea of getting free services. If the intervention work as expected, they stay, if not, they quit. This could as well explain why the majority were willing to pay for index insurance. To prove this, some farmers reported that the reasons for their WTP is to be able to access support from the government. Whilst some may be curious to try new things, others may be genuinely in

need for adaptation due to their experiences with risks. Taking a glance at respondents’ socioeconomic characteristics; origin, land ownership, perception of risk occurrence, satisfaction with insurance, extension service, subsidies and experience of credits had significant influence on WTP in the simple logistic regression model. Per the a priori expectation, native farmers who have rights to lands have some form of stability in the community compared to migrants. It was also observed that migrant farmers were less willing to pay than natives. In addition, the coping measures of some migrant farmers against extreme events were that they would sell their cocoa farms and relocate. This proves that migrant farmers are prone to migration and sale of assets as their short-term reaction to risks (Feurer 2016). Farmers perceived high possibility of risk occurrence based on their past experiences. Their experiences of extreme events and perception of risks might have as well shaped their choice of adaptation (Addisu et al. 2016; Atinkut and Mebrat 2016; BalmaIssaka et al. 2016; Zhang and Fan 2016). One assumption was that farmers who have accessed insurance schemes and were satisfied with them would be more willing to pay for index insurance. The National Health Insurance Scheme (NHIS) is the most widely used insurance policy in Ghana and the majority of the respondents were satisfied with it. The level of satisfaction could as well be used to explain the interest farmers expressed for index insurance. In the surveys, some respondents reported that index insurance can serve as a financial backbone to secure their income and relieve them from taking loans. Others reported that it can support their livelihoods, protect cocoa production through input supply by insurers and serve as an additional source of funding, especially in their pension years. This shows that farmers see index insurance as a reliable cover for their perceived risks. Interviews with key stakeholders revealed that a cocoa index insurance programme could be done in Ghana. It would, however, require time, education, capacity building and adequate preparation among stakeholders (Annex). Some insurance companies saw index insurance as a laudable initiative that is likely to be embraced by farmers. Others thought that the area is too risky to venture into due to the level of illiteracy and poor organisation among cocoa farmers. Furthermore, the level of risks e.g. basis risks involved in index insurance is unknown. Some concerns were that farmers may not be able to continue with premium payment after a few trials. COCOBOD considered index insurance as very feasible. They mentioned that farmers already attend capacity building programmes organised by COCOBOD and NGOs, and index insurance could easily be incorporated there. On the account of farmers’ ability to pay, COCOBOD was optimistic that some form of Tri-pedal scheme involving farmers, the government and donor agencies could be adopted. The Ghana Meteorological Agency is very important since index insurance depends on historical-time series weather data. Unfortunately, this study could not access its response on the availability of historical weather data and its reliability. However, the REDD+ implementation strategy report of the country pointed out that the Ghana Meteorological Agency has such data available (Mason et al. 2016). The report also referred to an online platform which could provide time-series weather data for free (FARMD 2014). The reliability of such data, however, could not be verified in this thesis. Although all respondents foresaw some threats, a key informant interview revealed that index insurance would be possible with education and careful planning. Index insurance is likely to work if key stakeholders are consulted and brought on board when designing the policy (Ahmed 2013; Rohrer 2016, personal communication).

Conclusions and recommendations: Farmers have high interest in index insurance which may be connected to their experiences of the changes in the weather patterns. They perceive insurance as an initiative that can motivate the youth into cocoa production and secure their livelihoods. Institutional structures and the enabling environment can influence adoption and implementation of index insurance policies. Insurance companies will be willing to provide index insurance packages to cocoa farmers provided they can measure the risks involved and quantify the cost of premiums. They are, however, concerned about farmers’ level of education and organisation and how index insurance can be sold to them. COCOBOD and other cocoa institutions are optimistic about the adoption of index insurance. Yet, it is not clear whether the available historical time-series weather and yield data is accurate and reliable enough. The main policy recommendation based on these findings is to advance the concept of index-based insurance by training the cocoa extension service division to educate farmers on index insurance. A countrywide census database on cocoa farmers could promote easy access to yield data for informed decisions. Further studies should be conducted on the availability and reliability of time-series weather data. Formation of farmer cooperatives could help enhance the flow of information and start-up of index insurance. The findings of this study sound promising. However, without clear structures and resources allocated for the adoption and implementation of index insurance, its future remains uncertain.

References

- Addisu S, Fissaha G, Gediff B, Asmelash Y, 2016. Perception and adaptation models of climate change by the rural people of lake Tana Sub-Basin, Ethiopia. *Environmental Systems Research*, 5 (7), 1–10, accessed on 10.08.2016.
- Ahmed T, 2013. Scoping report. Current status of index-based insurance in Bangladesh. WorldFish, Penang, Malaysia Project Report, 38.
- Aidoo R, Mensah Osei J, Wie P, Awunyo-Vitor D, 2014. Prospects of crop insurance as a risk management tool among arable crop farmers in Ghana. *Asian Economic and Financial Review*, 4 (3), 341–354.
- Akhter A, 2013. Farmers’ willingness to pay for index based crop insurance in Pakistan. A case study on food and cash crops of rain-fed areas. *Agricultural Economics Research Review*, 26 (2), 241–248.
- Aneani F, Anchirinah VM, Asamoah M, Owusu-Ansah F, 2011. Analysis of economic efficiency in cocoa production in Ghana. *African Journal of Food, Agriculture, Nutrition and Development*, 11 (1), 4507–4526.
- Atinkut B, Mebrat A, 2016. Determinants of farmers choice of adaptation to climate variability in Dera woreda, south Gondar zone, Ethiopia. *Environmental Systems Research*, 5 (6), 1–8, accessed on 10.08.2016.
- BalmaIssaka Y, Wumbei LB, Buckner J, Nartey RY, 2016. Willingness to participate in the market for crop drought index insurance among farmers in Ghana. *African Journal of Agricultural Research*, 11 (14), 1257–1265, accessed on 21.06.2016.
- Ćurak M, Džaja I, Pepur S, 2013. The effects of social and demographic factors on life insurance demand in Croatia. *International Journal of Business and social sciences*, 4 (9), 65–72.
- Danso-Abbeam G, Addi KN, Ehiakpor D, 2014. Willingness to pay for farm insurance by smallholder cocoa farmers in Ghana. *Journal of Social Science for Policy Implications*, 2 (1), 163–183.
- FARMD (Forum for Agricultural Risk Management in Development), 2014. Brief summary of organization’s risk management work, accessed on 17.08.2017, <http://agriskmanagementforum.org/org/awhere-inc>
- Feurer M, 2016. The role of mangrove community forests for climate change adaptation in the Ayeyarwady Delta. A community-based vulnerability assessment, unpublished. Bern University of Applied Sciences, Zollikofen, 120 p.
- Greatrex H, Hansen JW, Garvin S, Diro R, Blakeley S, Le Guen M, Rao KN, Osgood DE, 2015. Scaling up index insurance for smallholder farmers. Recent evidence and insights. *Climate Change, Agriculture and Food Security (CCAFS)*. CGIAR Research Program on Climate Change, Agriculture and Food Security, 14, accessed on 19.05.2015, <https://ccafs.cgiar.org/>
- ICCO (International Cocoa Organization), 2013. Growing cocoa. Origins of cocoa and its spread around the world, accessed on 10.05.2017, <https://www.icco.org/about-cocoa/growing-cocoa.html>
- Laderach P, Eitzinger P, Martínez A, Castro N, 2011. Predicting the impact of climate change on the cocoa-growing Regions in Ghana and Cote d’Ivoire, accessed on 05.06.2016, <https://link.springer.com/article/10.1007%2Fs10584-013-0774-8>
- Laderach P, Martinez A, Schroth G, Castro N, 2013. Predicting the future climatic suitability for cocoa farming of the world’s leading producer countries, Ghana and Côte d’Ivoire. *Climate Change*, 119 (3-4), 841–854.
- Mason JJ, Asare R, Cenamo M, Soares P, Carrero G, Murphy AJ, Bandari C, 2016. Ghana Cocoa REDD+ Programme. The Development of Ghana’s Emission Reductions Implementation Plan, unpublished, Accra, Ghana, 77 p.
- Ntiamoah A, Afrane G, 2008. Environmental impacts of cocoa production and processing in Ghana. Life cycle assessment approach. *Journal of Cleaner Production*, 16 (16), 1735–1740.
- Okoffo ED, Denkyirah EK, Adu DT, Fosu-Mensah BY, 2016. A double-hurdle model estimation of cocoa farmers’ willingness to pay for crop insurance in Ghana. *SpringerPlus*, 5 (1), 873.
- Rohrer M, 2016. Index based insurance: Advantages and challenges from farmers’ perspective of 04.08.2016.
- Zhang R, Fan D, 2016. Evaluating farm-level crop insurance demand in China. A double-bounded dichotomous approach. *Journal of Agricultural Science*, 8 (3), 10–20.

Annex

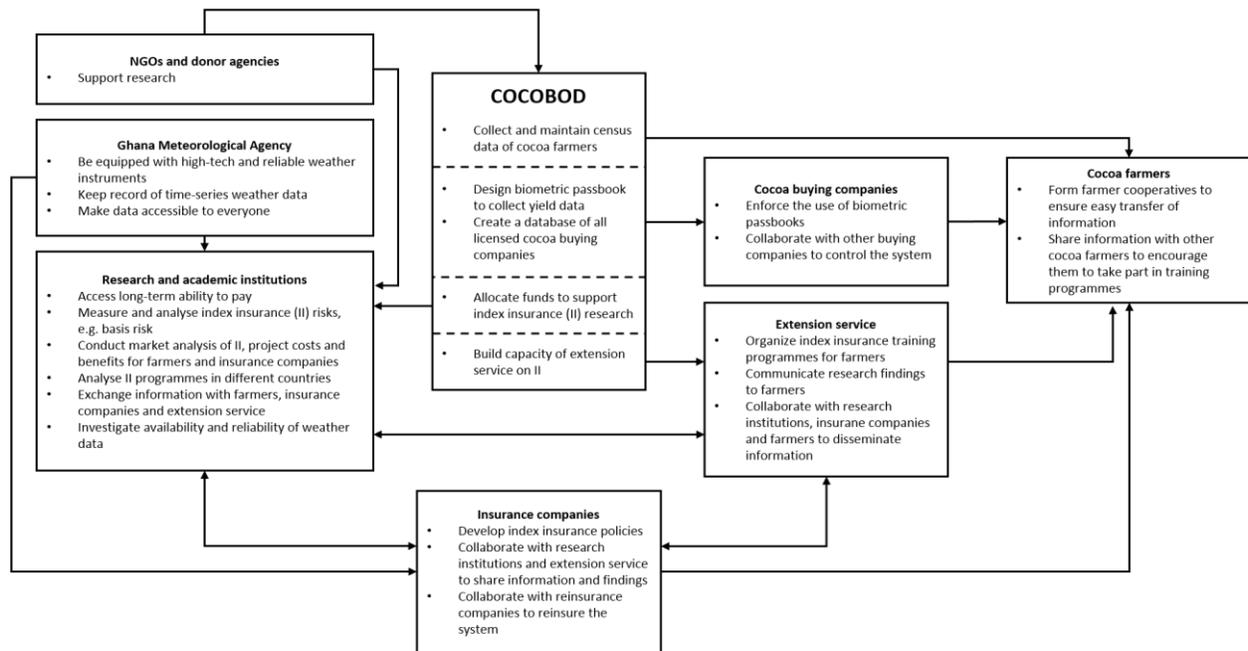


Figure 1: Recommended approach to index insurance readiness preparation by stakeholders in Ghana