

Table S1. Top relevant sources in the weather-index insurance, smallholder farmer’s welfare and maize productivity documents as indexed in WoS and Scopus, from 1990 to 2019.

SN	Sources	Articles
1	Agricultural finance review	12
2	Food security	6
3	Agricultural economics	5
4	Experimental agriculture	5
5	Agrekon	4
6	German journal of agricultural economics	4
7	Journal of stored products research	4
8	Weather climate and society	4
9	African journal of agricultural and resource economics-afjare	3
10	American journal of agricultural economics	3

Table S2. Most relevant keywords in the weather-index insurance, smallholder farmers’ welfare and maize productivity documents as indexed in WoS and Scopus, from 1990 to 2019.

SN	Author Keywords (DE)	Articles	Keywords-Plus (ID)	Articles
1	Weather index insurance	21	Crop insurance	15
2	Maize	12	Risk	15
3	Insurance	11	Agriculture	12
4	Index insurance	10	Climate change	11
5	Smallholder farmers	10	Adoption	10
6	China	9	Derivatives	10
7	Crop insurance	9	Management	10
8	Agriculture	8	Impact	9
9	Weather index-based insurance	8	Rainfall	9
10	Basis risk	7	Africa	8
11	Weather index	7	Productivity	8
12	Adoption	6	Zea mays	8
13	Drought	6	Credit	7
14	Weather risk	6	Demand	7
15	Willingness to pay	6	Technology	7
16	Africa	5	Basis risk	6
17	Food security	5	Variability	6
18	Nigeria	5	Yield	6
19	Bounded rationality	4	Drought	5
20	Hedging effectiveness	4	Drought insurance	5

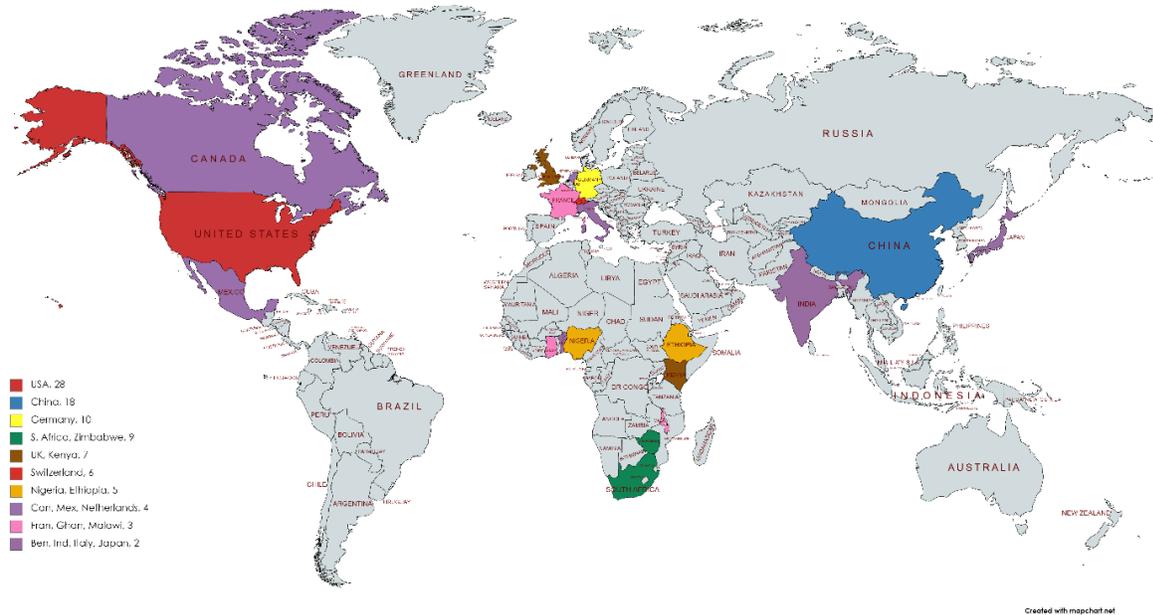


Figure S1. Countries of corresponding authors’ primary affiliation, with number of corresponding authors listed in the lower left

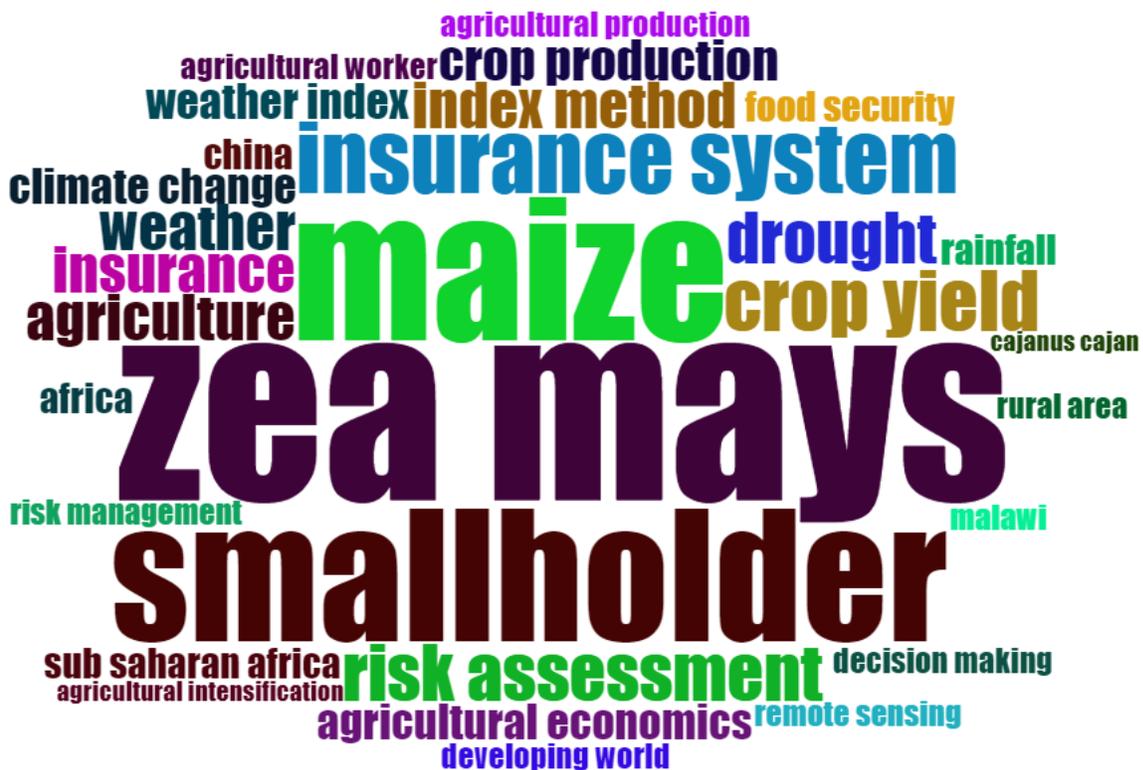


Figure S2. Word-cloud of 30 top key terms frequently used by authors in weather-index insurance and smallholder farmers’ welfare and maize productivity studies.

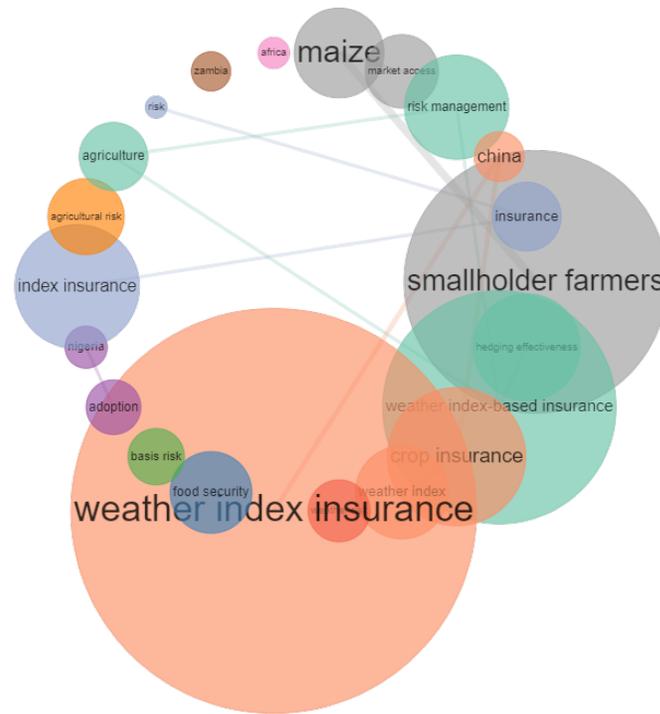


Figure S3. Top 20 Co-occurrence network of author keywords in publications on weather-index insurance, smallholder farmers’ welfare and maize productivity-related research.

Table S3. Most productive top 10 authors based on h-index, g-index and m-index, in the weather-index insurance, smallholder farmers’ welfare and maize productivity documents as indexed in WoS and Scopus, from 1990 to 2019.

SN	Author	Articles	h-index	g-index	m-index	Total citations	PY_start
1	Musshoff O	9	6	9	0.6000000	87	2011
2	Hirschauer N	6	2	3	0.2857143	14	2014
3	Baiyegunhi L	5	4	5	0.6666667	34	2015
4	Finger R	5	5	5	0.5555556	79	2012
5	Giller K	5	5	5	0.4545455	221	2010
6	Osgood D	5	3	5	0.3333333	56	2012
7	Hellin J	4	3	4	0.2727273	111	2010
8	Mmbando F	4	3	4	0.5000000	30	2015
9	Mvumi B	4	3	4	0.1200000	55	1996
10	Waddington S	4	4	4	0.1379310	96	1992

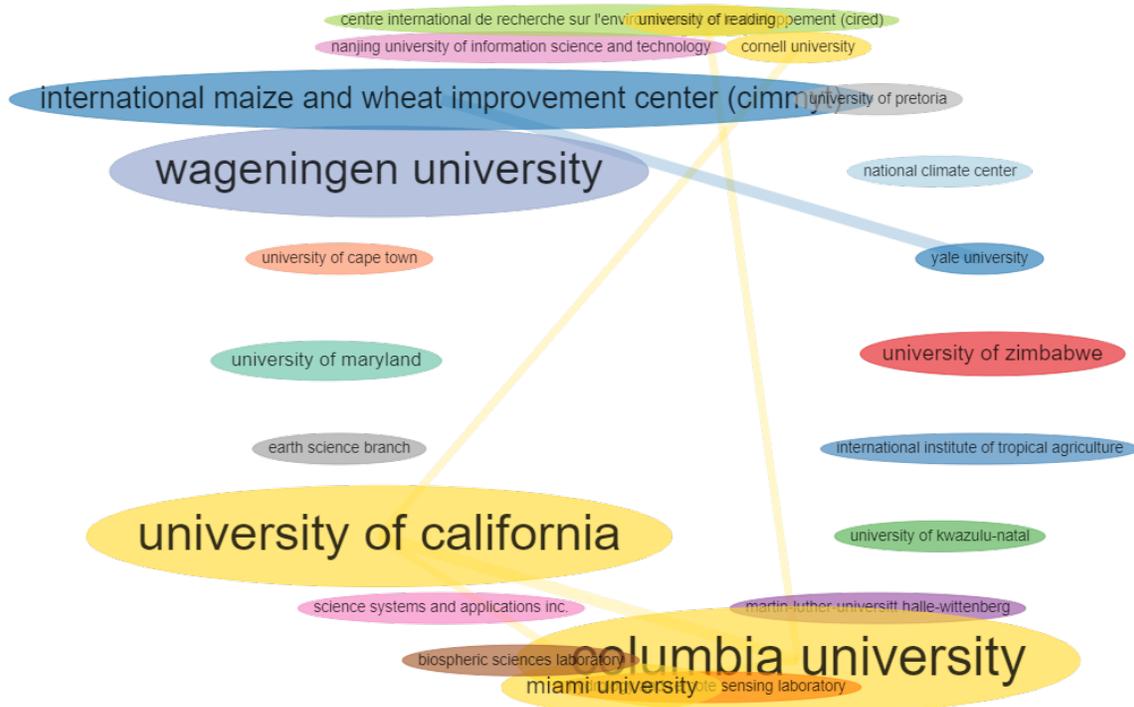


Figure S4. Institutions collaboration network showing strengths and frequency in publications on weather-index insurance related research.

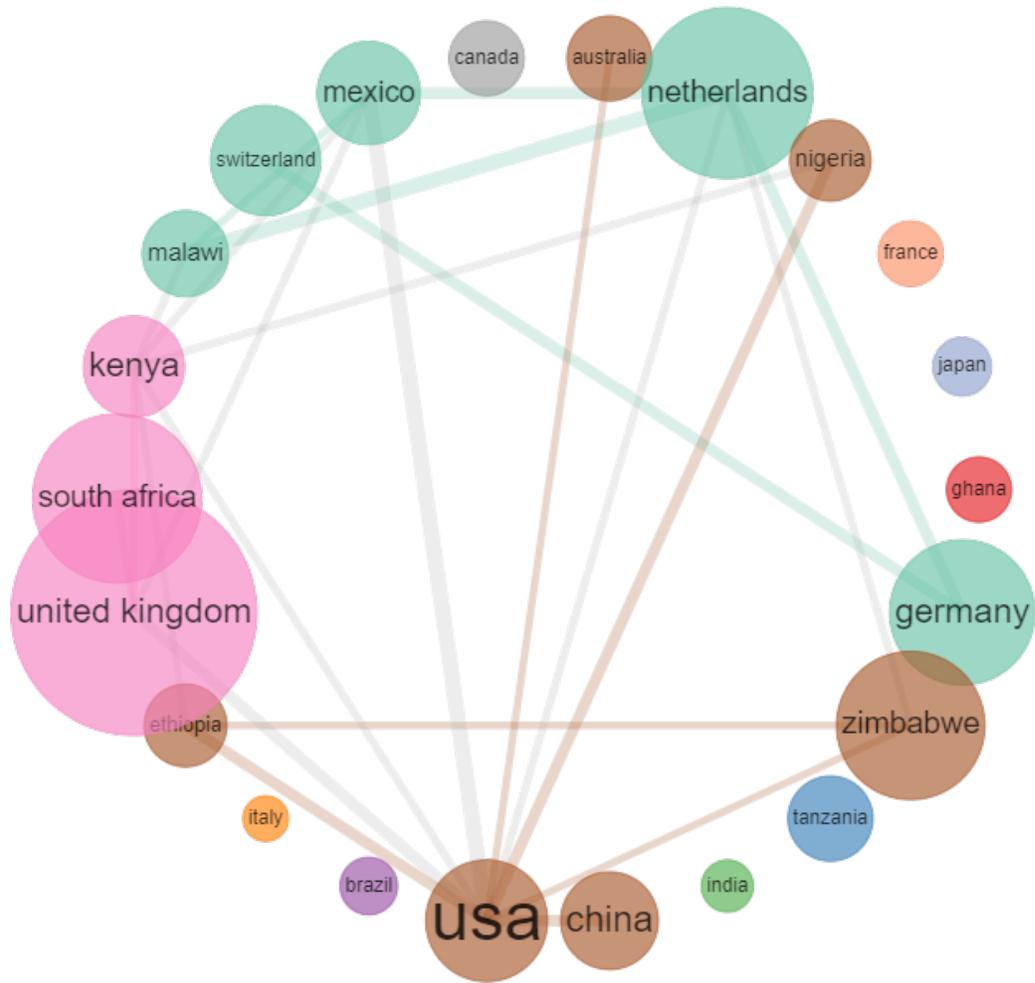


Figure S5. Collaboration network of countries participating in the publications on weather-index insurance related research.

Table S4. Synthesis of selected research erudition on weather-index insurance studies influenced by the welfare and productivity of smallholder maize farmers. Also included are policy recommendations raised by the selected research.

S/N	Authors	Main concepts	Methods	Major findings	Policy recommendations
1.	Marr et al. (2016)	Adoption and impact of index-insurance and credit for smallholder farmers in developing countries: A systematic review	Adopted a systematic literature method, which relied on a search in Scopus and Web of Science.	The study found that the interaction between basis risk and price is important to the design of index-insurance products since basis risk determines the demand for the weather index-insurance products.	The study suggested that a rigorous understanding of the potential of index-insurance and credit is essential for identifying the right mix of financial products that help smallholder farmers to increase farm productivity and their well-being.
2.	Dalhaus et al. (2018)	Test and compare different approaches to find the occurrence dates of these phases and use this information to reduce the temporal basis risk of WII, in Germany.	Based on an explicit review of public and open databases of phenology reports.	Crop growth stage modelling which is based on growing degree days (thermal time) does not result in significant improvements in the risk associated with WII.	Policies focusing on the improvements of WII schemes are crucial, for reducing temporal basis risk.
3.	Sibiko et al. (2018)	The study analyzed the experience of smallholder farmers with an existing WII program and how specific changes in the contractual design might encourage uptake in Kenya.	A choice experiment and a socio-economic survey of farm households in Kenya were used.	Findings showed that farmers' mean willingness to pay is about 25% lower than the average premium rate charged by the insurance provider. Lower premium rates could probably contribute to increased insurance uptake.	Communication should be improved to increase farmers' willingness rather than investing in additional weather stations, as this may cause a wider insurance uptake.
4.	Liu et al. (2019)	Estimating farmers' willingness to pay (WTP) for a hypothetical excess rainfall index insurance contract in China.	Employed a natural experiment framework.	Farmers from flooded areas have a higher willingness to pay for index insurance than farmers from non-flooded areas.	To ensure the index insurance pilot project is successful, policies that will increase the training of local village officers about the term of index insurance and marketing strategy are needed.
5.	Ali et al. (2020)	This paper assessed farmers' willingness to pay for WII as a market option for sharing climatic risks.	A choice modelling approach was employed based on data collected from 704 randomly selected households in northern Togo.	The results show that WII should not be offered standalone but interlinked with other factors such as providing drought tolerant and high yielding varieties.	As a climate change adaptation policy, WII could be bundled with other risk-reducing options for better uptake and to improve farmers' welfare
6.	Tang et al. (2020)	The study assessed the impact of weather index insurance on farmers' credit default rates and its implications for social capital.	The field experiment involved a survey of respondents' views regarding weather insurance and credit.	The following are the main findings from the study: (a) WII can effectively reduce the farmers' credit default rates after helping farmers diversify natural risks, (b) natural disasters are the main drivers of farmers' credit defaults	The government should implement WII to help farmers resist natural risks, and encourage banks to cooperate with insurance companies to ease farmers' credit constraints, which can also promote the progress of other developing countries.