International Journal of Social Economics

Adoption and intensity of agricultural insurance coverage in rural Senegal

Malick Ndiaye
Higher Institute for Agricultural and Rural Training, Alioune Diop University of Bambey, Bambey, Senegal, and
Simplice Asongu
Department of Economics, University of South Africa, Pretoria, South Africa; Department of Economics, Tashkent State University of Economics, Tashkent, Uzbekistan and Institute of Convergence Science, Korea University, Seoul, South Korea

Received 5 April 2026
Revised 10 July 2026
Accepted 18 August 2026

Abstract

Purpose – Farmers' decisions to take up agricultural insurance are often shaped by deep-seated psychological and cognitive processes rather than purely economic considerations. This manuscript addresses an important gap in the literature by examining both farmers' decisions to adopt agricultural insurance and the extent of their participation in insurance programs.

Design/methodology/approach – This study uses data from a nationally representative survey conducted in Senegal in 2017, covering 1,200 rural households engaged in dry cereal production. It employs an econometric framework that integrates logit, ordered logit and Heckman selection models to assess the influence of key determinants on insurance uptake. These include awareness of insurance products, trust in insurance providers, financial constraints, perceptions of climate-related risks and participation in cooperatives or agricultural extension services.

Findings – Agricultural insurance adoption remains relatively limited, with only approximately 30% of surveyed farmers subscribing to an insurance scheme. The findings indicate that awareness, educational attainment and access to credit constitute the primary drivers of insurance adoption. In addition, trust in insurers and prior exposure to climatic shocks significantly increases the likelihood of subscription. With respect to the level of coverage proxied by the insured amount in CFA francs, the highest elasticities are associated with farm size (+0.397 per logarithmic hectare), agricultural income (+0.034 per thousand CFA francs) and cooperative membership (+8.45). These findings underscore the complementary roles of financial capacity, institutional support and behavioural factors in influencing both farmers' decisions to adopt agricultural insurance and the level of coverage they choose.

Practical implications – Targeted policy interventions, such as rural radio campaigns, tax incentives and strengthened extension services, could potentially double the adoption rate (currently around 30%) while enhancing farmers' resilience to climate-related risks in Senegal.

Originality/value – This study contributes to the agricultural insurance literature by proposing a multidimensional modelling framework that simultaneously examines insurance adoption and the intensity of participation. By integrating behavioural, socioeconomic and institutional determinants within a unified analytical framework, it complements the extant literature by examining drivers of farmers' decisions to adopt agricultural insurance.

Keywords agricultural insurance, Coverage intensity, Rural households, Climate risk perception, Senegal

Paper type Research article

© Malick Ndiaye and Simplice Asongu. Published by Emerald Publishing Limited. This article is published under the Creative Commons Attribution (CC BY 4.0) licence. Anyone may reproduce, distribute, translate and create derivative works of this article (for both commercial and non-commercial purposes), subject to full attribution to the original publication and authors. The full terms of this licence may be seen at http://creativecommons.org/licences/by/4.0/

Funding: The authors did not receive support from any organisation for the submitted work. No funding was received to assist with the preparation of this manuscript. No funding was received for conducting this study.

Declaration of interest statement: The authors affirm that there are no conflicts of interest associated with this research.

International Journal of Social Economics
Emerald Publishing Limited
e-ISSN: 1758-6712
p-ISSN: 0306-8293
DOI 10.1108/IJSE-04-2026-0381

Downloaded from ftp.nowpublishers.com/ijse/article-pdf/doi/10.1108/IJSE-04-2026-0381/11823131/ijse-04-2026-0381en.pdf by guest on 05 September 2026

1. Introduction

Extreme climate-related disasters account for approximately 80% of agricultural losses in developing countries, thereby increasing production costs and undermining food security (Food and Agriculture Organization, 2017). Dang *et al.* (2024) illustrate this pattern by documenting the high sensitivity of cereal yields to rising temperatures in low-income economies, where such shocks further intensify household vulnerability. Projections by the Intergovernmental Panel on Climate Change (2022) suggest that these trends are likely to worsen, leading to deeper rural poverty and widening income disparities.

In response to these growing vulnerabilities, both scholars and policymakers increasingly advocate for formal risk management instruments, among which agricultural insurance occupies a central position. Well-designed crop insurance schemes can effectively shield farm incomes from adverse weather events such as droughts, floods and frost while contributing to production stability (Santeramo *et al.*, 2024). More broadly, rural insurance mechanisms help preserve the economic balance of farming households (Carrer *et al.*, 2020). Their role in safeguarding producers and fostering productive investment has been extensively documented (Karlan *et al.*, 2014).

Despite these potential benefits, uptake remains limited. Key barriers include institutional mistrust, low levels of financial literacy and credit constraints (Gaurav *et al.*, 2011; Cole *et al.*, 2013; Cai *et al.*, 2015), alongside informational asymmetries that hinder the proper functioning of insurance markets (Ali *et al.*, 2020). Adoption patterns also vary according to subsidy schemes, socioeconomic characteristics, risk perceptions, premium levels and productivity, with past exposure to climatic shocks playing a significant moderating role (Jorgensen *et al.*, 2020; Carrer *et al.*, 2020; Fahad and Jing, 2018).

In Senegal, rain-fed agriculture involves approximately 45.6% of households and remains highly exposed to rainfall variability, pest outbreaks and price fluctuations (ANSD, 2023). Forward-looking assessments project a contraction of the rainy season by nearly 20% by 2050 (Insurance Development Forum, 2023). Interest in agricultural insurance has intensified over the past decade, notably following the establishment in 2009 of the "Compagnie Nationale d'Assurance Agricole du Sénégal", in alignment with the "Loi d'Orientation Agro-Sylvo-Pastorale (LOASP)", with the objective of protecting production, incomes and farm assets.

Despite premium subsidies covering up to 50% and tax exemptions (CNAAS, 2023), nearly 90% of smallholder farmers remain uninsured (United Nations Development Programme, 2024). Recent empirical studies provide further insight into these dynamics. Cissé *et al.* (2025) quantify reductions in basis risk using indices such as Area Rainfall-based Index, Rainfall Estimates from satellitesà and ETr (Reference Evapotranspiration). Bonou *et al.* (2023), employing a quasi-experimental approach, estimate an average net gain of 25 USD among insured farmers. Atozou *et al.* (2017) highlight that the impact on groundnut production efficiency remains mixed. Finally, Syll (2021), using a Cox Andersen–Gill survival model, identifies cooperative membership, deferred premium payment and the timeliness of indemnity payments as key determinants of contract renewal.

This study contributes to the literature by jointly modelling both the adoption and the intensity of agricultural insurance among rural households in Senegal. It emphasises the critical role of product awareness, trust and financial constraints in shaping farmers' decisions. The findings provide actionable insights for the design of tailored insurance products and the implementation of sustainable policy instruments aimed at strengthening resilience to climate-related risks.

2. Empirical review

In the context of projected increases in both the frequency and severity of climate-related shocks, the absence of adequately designed public policies poses a substantial threat to

Downloaded from ftp.nowpublishers.com/ijse/article-pdf/doi/10.1108/IJSE-04-2026-0381/11823131/ijse-04-2026-0381en.pdf by guest on 05 September 2026

the income stability of smallholder farmers in developing and emerging economies (Issahaku and Abdulai, 2020; Chavas *et al.*, 2022). Within this framework, agricultural insurance has emerged as a central policy instrument. Clarke and Dercon (2016) show that access to insurance incentivises the adoption of improved farming practices and encourages productive investment, thereby contributing to enhanced food security. Empirical evidence provided by Bhuiyan *et al.* (2022) further establishes a causal relationship between the expansion of insurance (proxied by policy density and per capita indemnities) and increases in farm income. Complementarily, Ruan *et al.* (2024) highlight its role in stabilising yields and mitigating risks to food supply, reinforcing food security at the national level.

Despite the intensification of climatic and economic risks affecting agricultural systems, insurance uptake remains persistently low in most developing countries. Recent literature has therefore focused on identifying the determinants of adoption, viewed as a key strategy for managing agro-climatic risks.

Beyond its primary function as a risk management tool, agricultural insurance operates as a lever for broader socio-economic resilience. Xie *et al.* (2024) demonstrate that it facilitates risk-sharing, improves access to credit and strengthens the capacity of rural households to generate sustainable income streams. These mechanisms translate into enhanced resilience to climatic shocks and greater structural stability in rural areas. Its effects also extend to local development processes: Zhou *et al.* (2023) illustrate how insurance supports rural revitalisation through its contributions to local industry, environmental sustainability, education, governance and poverty reduction. In parallel, Xiao *et al.* (2022) and Wen *et al.* (2023) emphasise its role in narrowing urban–rural income disparities through gains in agricultural productivity, while Hou and Wang (2024) underline its contribution to value chain modernisation via agricultural innovation.

A broad set of socioeconomic characteristics such as education level, farming experience, farm size and indebtedness has been shown to significantly increase the likelihood of insurance participation (Zubor-Nemes *et al.*, 2018). Some studies (Mukhopadhyay *et al.*, 2019) have explored gender dimensions, finding that women may exhibit a higher propensity to adopt agricultural insurance. Previous experience with insurance, as well as exposure to past losses, positively influences both initial uptake and contract renewal decisions (Santeramo, 2018; Was and Kobus, 2018). Other contributions indicate that adoption is also shaped by land tenure structures and off-farm income (Li *et al.*, 2017) as well as by the degree of exposure to climatic risks (Chen and Zhao, 2024).

Conversely, several studies attribute low uptake rates to factors such as perceived reductions in expected indemnities (Park *et al.*, 2020), high price elasticity of demand (Mobarak *et al.*, 2012; Cole *et al.*, 2013; Karlan *et al.*, 2014) and structural constraints including liquidity shortages (Cole *et al.*, 2013), limited trust in insurers and insufficient understanding of insurance products (Hill *et al.*, 2013). Additional barriers can include weak social networks that constrain information diffusion as well as the presence of informal risk-sharing arrangements that may act as substitutes for formal insurance (Mobarak *et al.*, 2012).

In the Senegalese context, agricultural insurance is increasingly viewed as both a safeguard for farm incomes and a mechanism facilitating access to credit. Syll and Weingärtner (2017) identify higher income levels, credit access and prior insurance experience as key drivers of willingness to pay. Czura and Dequiedt (2015) show that the perceived value of insurance increases in environments characterised by constrained investment opportunities, such as incomplete seasonal markets. Focusing on the groundnut basin, Ricome *et al.* (2017) demonstrate that weather-index insurance reduces risk exposure and enhances incomes, particularly in arid zones with high climatic variability. Diagne *et al.* (2019) confirm the positive influence of education, high production costs, institutional risks and prior contractual experience.

Downloaded from ftp.nowpublishers.com/ijse/article-pdf/doi/10.1108/IJSE-04-2026-0381/11823131/ijse-04-2026-0381en.pdf by guest on 05 September 2026

These findings suggest that insurance adoption is shaped by a complex interplay of economic, informational and institutional factors, which collectively influence farmers' responses to uncertainty.

3. Data and methodology

3.1 Data

This study uses data from the 2017 national survey on dry cereals conducted by Senegal's Ministry of Agriculture and Rural Equipment (MAER) under the Agricultural Policy Support Project (PAPA). Although the survey data used in this study were collected in 2017, they remain relevant for analysing the fundamental mechanisms underlying farmers' agricultural insurance decisions. The primary objective of this research is to identify the structural, behavioural and institutional determinants shaping insurance uptake. These factors, including access to information, institutional trust, financial constraints and integration into agricultural networks, represent relatively persistent dimensions over time and remain highly relevant for informing the design and targeting of public policies. Such surveys are part of the national agricultural statistical system, whose mandate is to generate consistent, reliable and representative data to inform public decision-making, support policy evaluation and underpin sectoral economic analysis (MAER, 2017).

Data collection relied on a multi-tier institutional framework involving Regional Directorates for Rural Development, decentralised agricultural statistical services and the Directorate of Analysis, Forecasting and Agricultural Statistics, which oversees methodological design, data processing and dissemination.

The survey primarily aims to provide a detailed characterisation of farm households engaged in dry cereal production, namely millet, sorghum, maize and fonio, which dominate rain-fed farming systems in the Sahel and are inherently exposed to climatic variability and structural constraints in input access (MAER, 2017).

To this end, the dataset offers granular information covering (1) the socioeconomic profile of agricultural households; (2) production systems and technical practices; (3) yield levels and input use; (4) access to agricultural services, including credit, information and subsidies and (5) risk management strategies, encompassing agricultural insurance and adaptive responses.

Such data are critical for microeconomic analyses of farm behaviour, particularly in African settings where production, investment and risk-management decisions are shaped by pervasive market imperfections, especially in access to inputs, financial services and risk-sharing instruments (Ricome *et al.*, 2020).

3.2 Sampling method

This study relies on a two-stage stratified random sampling design implemented across all 14 regions and 51 departments of the country, with deliberate oversampling in areas where cereal production particularly millet, maize and sorghum predominates (MAER, 2017).

At the first stage, primary sampling units, defined as villages or rural communities, are selected based on stratification across major agroecological zones, namely the Groundnut Basin, the Sylvo-pastoral zone, the Senegal River Valley and Casamance. This approach ensures that variations in climatic conditions, production systems and exposure to agricultural risks are adequately represented.

At the second stage, farm households are randomly drawn within each selected community using a systematic sampling procedure. Additional emphasis is placed on cereal-producing farms through targeted oversampling.

Overall, 4,680 agricultural households are surveyed nationwide. However, in line with the specific objectives of this analysis, the working sample is restricted to 1,200 households meeting the following criteria (MAER/PAPA, 2017): engagement in dry cereal production, residence within one of the four selected agroecological zones and availability of complete

Downloaded from ftp.nowpublishers.com/ijse/article-pdf/doi/10.1108/IJSE-04-2026-0381/11823131/ijse-04-2026-0381en.pdf by guest on 05 September 2026

information on key variables related to awareness, adoption and the intensity of agricultural insurance use.

3.3 Method of analysis

The empirical analysis adopts a sequential approach that mirrors the household decision-making process: information acquisition (via radio, extension services or cooperatives) → product awareness (aware = 1/0) → adoption (adopt_ins = 1/0) → trust (conf_level: 1–5) → coverage intensity/insured amount (mt_insured in €). This structuring is consistent with the literature on agricultural innovation adoption, which views adoption decisions not as instantaneous choices but as the outcome of a gradual, multi-stage process (Dimara and Skuras, 2003).

All variables included in the econometric models were constructed from the survey questionnaire. Binary variables were coded as 1 when the condition was reported by the household and 0 otherwise, while ordinal variables were coded according to their original response categories.

A preliminary descriptive analysis is conducted to profile households according to their adoption status and to identify average differences based on access to information, credit and risk perception, providing initial insights into the underlying mechanisms driving insurance uptake.

Given the binary nature of the adoption decision, a logit model is employed to estimate the probability that a household subscribes to agricultural insurance (Cramer, 2003):

$$\Pr\left(adopt_{ins_i} = \frac{1}{X_i}\right) = \Lambda(X_i\beta) \tag{1}$$

The vector X_i encompasses households' socioeconomic attributes, access to information and risk-related characteristics. Average marginal effects are computed to facilitate the economic interpretation of the estimated coefficients.

The reported trust level (conf_level), measured on an ordinal scale from 1 to 5, is modelled using an ordered logit specification (Greene and Hensher, 2010):

$$conf\_level_i^* = Z_i + \varepsilon_i \tag{2}$$

where Z_i includes variables such as education, cooperative membership, access to credit, engagement with extension services and actual insurance adoption. The trust variable is derived from the survey question asking respondents to indicate their level of confidence in agricultural insurance providers. Responses range from 1 (very low trust) to 5 (very high trust), with higher values indicating greater confidence in insurers.

Climate risk perception is measured from the survey question asking households to evaluate their level of exposure to climate-related risks affecting agricultural production. Higher values indicate stronger perceived climate risk. Climate shock experience is defined from respondents' reports of recent climatic events (e.g. drought, irregular rainfall or floods) that affected their agricultural activities and is coded as a binary variable (1 = experienced a shock; 0 = otherwise).

The insured amount (amt_insured) is observed only for households that are aware of the insurance product (aware = 1), which introduces potential selection bias. To address this issue, a two-step Heckman selection model is estimated (Heckman, 1979):

$$Pr(aware_i = 1) = \Phi(W_i\delta) \tag{3}$$

where W_i incorporates instrumental variables that influence households' access to information but do not directly affect the insured amount, including age, education level, access to radio, contact with extension services and cooperative membership.

Downloaded from ftp.nowpublishers.com/ijse/article-pdf/doi/10.1108/IJSE-04-2026-0381/11823131/ijse-04-2026-0381en.pdf by guest on 05 September 2026

$$amt\_insured_i = X_i\beta + \lambda_i + \omega_i \quad (4)$$

where X_i includes farm size, household income, access to credit, risk perception and prior shock experience, and λ_i represents the inverse Mills ratio (IMR) derived from the selection equation. The statistical significance of the IMR (λ) provides a test for the presence of selection bias.

Other explanatory variables were measured as follows: education corresponds to the number of years of schooling of the household head; farm size is measured in hectares; agricultural income represents annual farm income; access to credit, cooperative membership, extension service contact and rural radio access are binary indicators reflecting households' financial and institutional linkages. Continuous variables were kept in their original units or transformed when required for econometric estimation.

To mitigate potential endogeneity concerns, several econometric choices were incorporated into the empirical strategy. First, the analysis follows the natural sequence of farmers' decision-making, beginning with information acquisition and awareness, followed by insurance adoption and, ultimately, the level of insurance coverage. This sequential framework helps reduce the risk of reverse causality by preserving the chronological order of the decision process. Second, a two-step Heckman selection model is employed to correct for the non-random selection arising from the fact that the insured amount is observed only for households that are aware of agricultural insurance. The inclusion of the IMR accounts for unobserved factors jointly influencing awareness and the insured amount, thereby reducing selection bias. Third, the empirical models control for a broad range of socioeconomic, institutional and behavioural characteristics to minimise omitted-variable bias.

4. Results and discussion

4.1 Descriptive statistics

Table 1 reports descriptive statistics. The results show a modest adoption of agricultural insurance (30%), despite a relatively high level of awareness (56%). This discrepancy is partially explained by a moderate level of trust in insurance (3.12 out of 5), suggesting that perceived reliability is a key determinant in the decision to subscribe. The gap between awareness and uptake highlights that information alone does not automatically translate into

Table 1. Variable descriptions

Variable	Description	Mean	Standard deviation
Insurance adoption	1 = subscribed; 0 = not subscribed	0.30	0.46
Awareness	1 = aware of the product; 0 = otherwise	0.56	0.50
Trust level (1–5)	Confidence in insurance: 1 = low; 5 = high	3.12	1.04
Education	Years of schooling of household head	6.0	4.1
Farm size	Cultivated area (ha)	3.1	2.3
Household income	FCFA/year (thousands)	1,900	1,050
Access to credit	1 = agricultural credit; 0 = otherwise	0.29	0.45
Previous shock	1 = recent climate shock; 0 = otherwise	0.43	0.50
Cooperative membership	1 = member; 0 = otherwise	0.34	0.47
Radio access	1 = regular access; 0 = otherwise	0.52	0.50
Extension contact	1 = contact with extension services; 0 = otherwise	0.31	0.46
Risk perception (1–5)	Climate risk: 1 = low; 5 = high	3.9	0.9
Age (years)	Age of household head	45	12

Note(s): FCFA = African Financial Community franc

Source(s): Authors' calculations

Downloaded from ftp.nowpublishers.com/ijse/article-pdf/doi/10.1108/IJSE-04-2026-0381/11823131/ijse-04-2026-0381en.pdf by guest on 05 September 2026

purchasing behaviour; the credibility of providers and perceived contract enforceability appear central.

The results further indicate that the average trust level stands at 3.12/5, whereas the perceived climate risk reaches 3.9/5. This gap implies that low adoption is not driven by underestimation of risk but rather by structural or behavioural constraints. In other words, demand exists (high risk perception) but is constrained by factors that limit the ability or willingness to convert perceived need into actual purchase.

Household heads report an average of six years of education, reflecting variation in understanding of insurance products. Farms average 3.1 ha in size, with a substantial standard deviation of 2.3, highlighting the coexistence of both small and large-scale operations. This heterogeneity suggests that policy measures may need to be differentiated by farm scale and human capital to be effective.

Economically, the low average agricultural income (approximately €1,900 per year), combined with limited access to credit (29%), substantially reduces farmers' capacity to purchase insurance. Additionally, nearly 43% of producers report experiencing a recent shock, confirming their high exposure to risk. These figures point to liquidity and affordability constraints as major structural barriers: even when farmers recognise risk and are aware of products, they may lack the short-term funds or credit mechanisms to pay premiums.

Low rates of cooperative membership (34%), contact with extension services (31%) and regular access to rural radio (52%) constrain the dissemination of information, the development of collective trust and social learning around insurance adoption. Strengthening collective platforms and trusted local intermediaries could therefore amplify both comprehension and collective confidence in insurance offerings.

Finally, the mean age of producers is 45 years, indicating a relatively mature population, which may influence the likelihood of adopting agricultural insurance positively or negatively depending on contextual factors. Age effects may interact with risk preferences, experience and openness to innovation, so targeted messaging and delivery channels should account for demographic heterogeneity.

Overall, the descriptive statistics highlight a marked gap between awareness and actual adoption of agricultural insurance, suggesting that multiple socioeconomic, institutional and behavioural factors may influence farmers' insurance decisions. The relative importance of these factors is examined in the econometric analysis that follows.

4.2 Determinants of agricultural insurance adoption

Table 2 presents the estimates of a logit model applied to agricultural insurance adoption (1 = subscribed), reported as marginal effects (dy/dx) to allow direct interpretation in terms of probabilities. The empirical results highlight several significant determinants of the subscription decision.

Awareness of insurance products emerges as the principal driver of adoption. The estimated coefficient (0.742; $p < 0.01$) corresponds to a marginal effect of +14.9% on the probability of subscribing, demonstrating that access to information substantially increases farmers' propensity to adopt insurance. This finding underscores the critical role of information campaigns and extension programs in disseminating insurance products. However, given the cross-sectional nature of the data and potential selection on unobservables, this relationship should be interpreted as an association rather than a strictly causal effect; more informed farmers may also differ systematically in resources, networks or entrepreneurial attitudes.

The results also indicate that human capital and institutional trust are key factors. Education exerts a positive and statistically significant effect (0.398; $p < 0.01$), implying that each additional year of schooling raises the probability of adoption by approximately 7.9%. Similarly, trust in the insurer (0.286; $p < 0.05$) increases the likelihood of subscribing by 5.7%, confirming that understanding contractual mechanisms and institutional credibility are essential prerequisites for acceptance of agricultural insurance. This result highlights the

Downloaded from ftp.nowpublishers.com/ijse/article-pdf/doi/10.1108/IJSE-04-2026-0381/11823131/ijse-04-2026-0381en.pdf by guest on 05 September 2026

Table 2. Agricultural insurance adoption (logit model, marginal effects)

Variable	Logit coef. (SE)	*z*-Stat	d*y*/d*x* (SE)
Awareness	0.742*** (0.191)	3.88	0.149*** (0.038)
Education	0.398*** (0.109)	3.65	0.079*** (0.022)
Trust	0.286** (0.132)	2.17	0.057** (0.026)
Farm size (log ha)	0.301** (0.138)	2.18	0.060** (0.028)
Income (k FCFA)	0.244*** (0.079)	3.09	0.049*** (0.016)
Access to credit	0.671*** (0.176)	3.81	0.134*** (0.035)
Climate risk (ref = 1)			
– Category 2	0.112 (0.145)	0.77	0.022 (0.029)
– Category 3	0.189* (0.102)	1.85	0.038* (0.020)
– Category 4	0.219** (0.103)	2.13	0.044** (0.021)
– Category 5	0.312** (0.128)	2.44	0.062** (0.025)
Extension contact	0.355** (0.149)	2.38	0.071** (0.030)
Past climate shock	0.587*** (0.161)	3.65	0.118*** (0.031)
Cooperative membership	0.362** (0.151)	2.40	0.072** (0.030)
Rural radio access	0.187* (0.112)	1.67	0.037* (0.022)
Age	−0.014 (0.010)	−1.40	−0.003 (0.002)
Constant	−2.436*** (0.643)	−3.79	–

Note(s): ***$p < 0.01$, **$p < 0.05$, *$p < 0.10$. SE = Standard Error
Source(s): Authors' calculations

behavioural dimension of insurance adoption, where confidence in providers may reduce uncertainty regarding contract performance and perceived transaction risks.

Farm economic characteristics further influence adoption decisions. Farm size (log hectares; $p < 0.05$) has a positive and significant effect, indicating that an increase in cultivated area raises the probability of subscribing by around 6.0%. Likewise, agricultural income exhibits a positive and significant impact (+4.9%; $p < 0.01$), suggesting that financially stronger farms are better positioned to incorporate insurance into their risk management strategies. Access to credit emerges as a particularly important financial lever: farmers with access to financing show a 13.4% higher probability of adoption ($p < 0.01$), reflecting the role of liquidity constraints in limiting insurance participation. These findings suggest that affordability and financial capacity remain central determinants of insurance uptake, particularly among smallholder farmers facing competing demands for limited household resources.

The results also highlight the importance of climate risk perception. Compared with the reference category characterised by low-risk perception, higher levels of perceived risk (categories 4 and 5) increase the probability of adoption by 4.4% and 6.2%, respectively ($p < 0.05$). These findings confirm that heightened awareness of climatic hazards fosters demand for protective instruments. Consistently, past experience of climate shocks significantly raises the probability of subscription (+11.8%; $p < 0.01$), illustrating a process of experiential learning and adaptation to perceived risk. Farmers who have directly experienced climate-related losses may therefore be more likely to recognise the potential value of insurance as a risk management instrument.

Institutional and informational channels also play a notable role in the diffusion of agricultural insurance. Access to extension services increases the probability of adoption by approximately 7.1% ($p < 0.05$), while cooperative membership raises this probability by 7.2% ($p < 0.05$). These results highlight the importance of collective networks in information dissemination and the development of shared trust. Regular access to rural radio has a more moderate positive effect (+3.7%; $p < 0.10$), yet still confirms the role of local media in raising awareness of institutional innovations. The combined influence of extension services, cooperatives and rural media suggests that adoption is embedded within broader systems of

Downloaded from ftp.nowpublishers.com/ijse/article-pdf/doi/10.1108/IJSE-04-2026-0381/11823131/ijse-04-2026-0381en.pdf by guest on 05 September 2026

social learning and institutional connectivity rather than being a purely individual financial decision.

These results on binary adoption illuminate a complex causal pathway and point to the need for further exploration of trust determinants, an intermediate variable that is often underappreciated in agricultural insurance analyses. Future research should prioritise identification strategies (valid instruments, panel data or natural experiments) to disentangle causal links and to inform targeted policy interventions that combine information provision, trust-building and credit facilitation.

4.3 Level of trust in agricultural insurance

Table 3 reports estimates derived from ordinal logit (ologit) and generalised ordinal logit (gologit2) models. The results demonstrate strong empirical consistency and satisfactory model fit, as evidenced by highly significant global statistics [Likelihood Ratio (LR)/Wald χ^2 tests at the 1% level and pseudo-R^2 around 18%]. These results confirm the appropriateness of the chosen specification for analysing the determinants of trust in agricultural insurance.

Empirical findings first indicate that direct experience with agricultural insurance is the most critical determinant of trust. Estimated coefficients are positive and statistically significant in both specifications ($\beta = 0.842$ for the ologit model and $\beta = 0.876$ for gologit2; $p < 0.01$). Marginal effects show that farmers who have previously experienced insurance are approximately 18.4% more likely to reach a higher trust category. This experiential effect remains robust across alternative specifications and when controlling for observable socioeconomic and agroecological confounders, highlighting the centrality of learning-by-doing in trust formation. This result remains robust despite a violation of the proportional odds assumption, as highlighted by the Brant test, suggesting that experiential learning plays a central role in the formation and consolidation of trust. This finding is consistent with the idea that trust in agricultural insurance is not formed solely through information exposure but is also shaped by farmers' direct interactions with insurance products and their perceptions of contract performance.

Table 3. Trust in agricultural insurance (Ologit vs. Gologit2)

Variable	Ologit coef. (SE)	Gologit2 coef. (SE)	Marginal effect, highest level (SE)	Brant test
Insurance adoption	0.842*** (0.214)	0.876*** (0.219)	0.184*** (0.038)	Violation
Awareness	0.316** (0.141)	0.349** (0.148)	0.072** (0.022)	Passed
Education	0.129** (0.061)	0.142** (0.064)	0.029** (0.009)	Passed
Farm size (log ha)	0.085 (0.073)	0.097 (0.076)	0.014 (0.011)	Passed
Income (k FCFA)	0.174** (0.082)	0.183** (0.085)	0.038** (0.016)	Passed
Credit access	0.498*** (0.162)	0.521*** (0.168)	0.091*** (0.035)	Passed
Risk perception	0.621*** (0.188)	0.654*** (0.196)	0.127*** (0.031)	Passed
Extension contact	0.203 (0.144)	0.221* (0.149)	0.046 (0.030)	Passed
Climate shock	−0.417** (0.197)	−0.442** (0.204)	−0.083** (0.031)	Passed
Cooperative membership	0.289* (0.158)	0.301* (0.163)	0.052* (0.030)	Passed
Rural radio access	0.112 (0.134)	0.126 (0.138)	0.021 (0.022)	Passed
Head's age (decades)	−0.021 (0.019)	−0.023 (0.020)	−0.004 (0.002)	Passed
Cutpoints/Constant	Yes	Yes	–	–
Observations	1,200	1,200	1,200	–
Log-likelihood	−374.22	−372.10	–	–
Wald/LR χ^2	162.45***	168.31***	–	–
Pseudo R^2	0.178	0.181	–	–

Note(s): ***$p < 0.01$, **$p < 0.05$, *$p < 0.10$ (Robust SE)

Source(s): Authors' calculations

Downloaded from ftp.nowpublishers.com/ijse/article-pdf/doi/10.1108/IJSE-04-2026-0381/11823131/ijse-04-2026-0381en.pdf by guest on 05 September 2026

Access to credit also exerts a positive and statistically significant effect on trust ($\beta = 0.498$; $p < 0.01$). The associated marginal effect indicates that farmers with access to credit are about 9.1% more likely to belong to a higher trust category. Similarly, climate risk perception emerges as an important structural determinant ($\beta = 0.621$; $p < 0.01$), with a marginal effect of 12.7%, indicating that farmers who are more aware of climatic hazards are more likely to express confidence in insurance mechanisms. This suggests an interaction between risk recognition and perceived usefulness of insurance as a risk-transfer tool.

Socioeconomic characteristics also show positive, though more moderate, effects. Education has a positive and statistically significant impact ($\beta = 0.129$; $p < 0.05$), implying that each additional year of schooling increases the probability of reaching a higher trust level by approximately 2.9%. Household income also has a positive and significant effect ($\beta = 0.174$; $p < 0.05$), raising the probability of belonging to a higher trust category by roughly 3.8%. These findings suggest that education may facilitate the understanding of insurance contracts and institutional procedures, while higher income reduces financial uncertainty associated with insurance participation.

Conversely, recent experience of a climate shock has a negative and statistically significant effect on trust ($\beta = -0.417$; $p < 0.05$). The corresponding marginal effect shows that households recently affected by a shock are about 8.3% less likely to express a high level of trust, which may reflect lingering vulnerability effects or a perception of institutional insufficiency in addressing incurred losses. An alternative interpretation is that recent losses may increase farmers' expectations regarding insurance performance, making them more critical when evaluating the reliability of insurance providers.

Institutional channels show mixed effects. Membership in an agricultural cooperative is associated with an approximately 5.2% higher probability of attaining a higher trust category ($p < 0.10$), highlighting the importance of collective networks in information dissemination and trust-building. In contrast, contact with extension services and exposure to rural radio exhibit positive but statistically non-significant effects, suggesting that information alone may be insufficient to convert perceptions into effective trust. The effectiveness of informational channels likely depends on message credibility, frequency and the presence of tangible service delivery.

Overall, these findings indicate that trust in agricultural insurance depends not only on observable socioeconomic characteristics but also on a dynamic process of learning and interaction with insurance mechanisms. The results reinforce the view that trust represents an intermediate behavioural mechanism linking farmers' exposure to information, previous insurance experiences and their subsequent participation decisions. Although the ordinal models identify significant factors associated with trust formation, they do not fully address potential endogeneity arising from self-selection into insurance participation or access to institutional networks. This dynamic motivates the extension of the analysis to insurance coverage intensity, where distinguishing between adopters and non-adopters requires Heckman-type selection correction to obtain unbiased econometric estimates.

Given the potential endogeneity between trust and adoption, we interpret these results as conditional associations; nevertheless, they motivate extending the analysis to coverage intensity – where distinguishing between adopters and non-adopters requires Heckman-type selection correction to reduce selection bias and improve inference.

4.4 Intensity of agricultural insurance coverage

Table 4 reports the estimates of a two-step Heckman selection model, combining a selection probit based on insurance awareness with a conditional ordinary least squares (OLS) regression on the insured amount [in FCFA (African Financial Community franc)]. We motivate this strategy by the non-random observation of insured amounts (only observed for aware/subscribing households) and by the need to correct for selection on both observables and unobservables under the Heckman identifying assumptions. Identification relies on a

Downloaded from ftp.nowpublishers.com/ijse/article-pdf/doi/10.1108/IJSE-04-2026-0381/11823131/ijse-04-2026-0381en.pdf by guest on 05 September 2026

Table 4. Intensity of agricultural insurance coverage (Heckman two-step)

Variable	Selection probit (Aware = 1)	OLS outcome (insured amount, FCFA)
Age (decades)	−0.015** (0.006)	−0.42 (0.31)
Education (years)	0.087*** (0.020)	2.11** (0.94)
Radio access (yes = 1)	0.341*** (0.078)	[excluded]
Extension contact (yes = 1)	0.269*** (0.060)	6.87* (3.62)
Cooperative membership (yes = 1)	0.312*** (0.072)	8.45** (3.89)
Farm size (log ha)	0.124* (0.067)	0.397*** (0.101)
Agricultural income (k FCFA)	0.002** (0.001)	0.034*** (0.012)
Credit access (yes = 1)	0.289** (0.112)	0.574*** (0.185)
Perceived climate risk (1–5)	0.098* (0.045)	0.228** (0.092)
Recent climate shock (yes = 1)	0.156** (0.061)	0.312* (0.164)
Distance to services (km)	−0.045*** (0.012)	[exclusion restriction]
Inverse Mills ratio (IMR, λ)	–	−0.482** (0.197)
Constant	−0.891*** (0.187)	1.126*** (0.293)

Note(s): ***$p < 0.01$, **$p < 0.05$, *$p < 0.10$ (SE bootstrapped, 200 reps)

Source(s): Authors' calculations

robust exclusion restriction, introducing instruments such as exposure to rural radio and distance to agricultural services accessibility (e.g. exposure to rural radio signal strength, distance to agricultural services, timing of local outreach).

This modelling strategy addresses the non-random observation of insurance coverage intensity, as the insured amount is only observed among households that are aware of and participate in insurance schemes. By explicitly modelling the selection process, the approach reduces potential bias arising from differences between insured and non-insured households. This econometric strategy corrects for selection bias arising from the observation of insured households only and captures the heterogeneity in coverage intensity more accurately.

Among subscribing households, several structural factors significantly determine the level of coverage. Education (+2.11 FCFA per additional year; $p < 0.05$), farm size (+0.397 FCFA per log ha; $p < 0.01$), agricultural income (+0.034 FCFA per thousand FCFA; $p < 0.01$) and credit access (+0.574 FCFA; $p < 0.01$) emerge as key drivers of insured amounts. These positive effects are consistent with risk portfolio optimisation logic: households with greater human and financial capital tend to internalise risk management more fully, adjusting coverage to their economic exposure. These positive associations align with portfolio-choice theory: households with greater human and financial capital are better able to comprehend and afford larger coverage and thus internalise risk management to a greater extent.

Institutional support also enhances subscription intensity. Guidance from agricultural extension services (+6.87 FCFA; $p < 0.10$), membership in a cooperative organisation (+8.45 FCFA; $p < 0.05$) and recent experience of climate shocks (+0.312 FCFA; $p < 0.10$) all contribute to higher coverage levels. Similarly, climate risk perception (+0.228 FCFA per point; $p < 0.05$) confirms the presence of rational adaptive behaviour: greater awareness of agro-climatic threats translates into a propensity to purchase higher insurance amounts. These results highlight the complementary role of institutional support and risk awareness in transforming insurance from a passive protection mechanism into an active component of farm-level risk management strategies.

Furthermore, the negative inverse Mills ratio (IMR = −0.482; $p < 0.05$) and the significant correlation of errors ($\rho = -0.312$; likelihood ratio test $p < 0.01$) indicate the presence of non-random selection into the observed insurance coverage sample. This pattern suggests that, conditional on observables, households more likely to be selected into the observed insured sample tend to purchase lower amounts than predicted; a plausible interpretation is initial

Downloaded from ftp.nowpublishers.com/ijse/article-pdf/doi/10.1108/IJSE-04-2026-0381/11823131/ijse-04-2026-0381en.pdf by guest on 05 September 2026

cautious behaviour by newly informed or recently enrolled farmers, consistent with a learning-by-doing process. This suggests that initially sensitised individuals, particularly through information channels such as rural radio, tend to subscribe to relatively lower amounts than predicted by their observable characteristics. This behaviour may reflect initial caution, stemming from limited familiarity with insurance mechanisms or a gradual learning process in the use of these risk management instruments.

Finally, the empirical validity of the exclusion restriction is confirmed. Distance to agricultural services significantly affects the probability of being aware of insurance (-0.045; $p < 0.01$) without directly influencing coverage intensity once the subscription decision is made. This property strengthens the credibility of the causal identification of the model and supports the relevance of the selection approach for analysing the determinants of agricultural insurance in the Senegalese context. Taken together, the results indicate that both affordability and institutional factors shape coverage intensity among Senegalese cereal producers, with important policy implications for bundling information, trust-building and credit access to increase effective coverage.

4.5 Discussion of results

The empirical findings confirm that the adoption of agricultural insurance follows a multidimensional process in which informational access, economic capacity and risk perceptions interact. The strongly positive effect of product awareness observed in this study aligns with the intuition that access to information is a critical condition for the proper functioning of rural insurance markets, where information asymmetries significantly limit farmer participation. Moreover, the studies of Cole *et al.* (2013) and Cai *et al.* (2015) demonstrate that limited understanding of insurance contracts and the complexity of insurance mechanisms constitute major barriers to adoption in developing countries.

The results further indicate that human capital plays a decisive role in the decision to subscribe, with education significantly increasing the likelihood of adoption. This relationship is consistent with the findings of Zubor-Nemes *et al.* (2018), who identify farmers' socio-economic characteristics, particularly education and farm size, as key determinants of agricultural insurance demand. The positive influence of income and credit access observed also highlights the importance of financial constraints in market participation. Indeed, Karlan *et al.* (2014) and Cole *et al.* (2013) show that liquidity limitations and sensitivity to premium costs are substantial obstacles to adoption, even when farmers recognise the potential benefits of insurance. In the Senegalese context, these results corroborate the observations of Syll and Weingärtner (2017), who note that farmers with higher incomes and better access to finance exhibit a greater willingness to pay for insurance products.

Additionally, perceived climate risk and previous experience of shocks emerge as significant adoption factors. These findings are in line with Santeramo (2018) and Was and Kobus (2018), who show that farmers gradually develop risk management strategies based on past experiences, with empirical learning strengthening the demand for protective instruments.

Beyond the initial subscription decision, the results reveal that trust in insurance products constitutes a central determinant of farmer behaviour. The strong positive effect of direct insurance experience on trust confirms the importance of institutional learning mechanisms. This observation resonates with Hill *et al.* (2013), who highlight that insurer credibility and transparency in indemnity mechanisms are major drivers of insurance acceptance.

In contexts where institutional trust remains fragile, farmers tend to perceive insurance contracts as uncertain or difficult to assess, thereby reducing their propensity to engage. The results also underscore the role of credit and risk perception in the formation of trust. These observations can be interpreted in light of Mobarak *et al.* (2012), who show that farmers often rely on informal solidarity networks when formal institutions are perceived as unreliable. Integrating insurance into broader financial arrangements, including agricultural credit or

Downloaded from ftp.nowpublishers.com/ijse/article-pdf/doi/10.1108/IJSE-04-2026-0381/11823131/ijse-04-2026-0381en.pdf by guest on 05 September 2026

farmer organisations, can thus enhance the credibility of these products and promote their diffusion.

The analysis of coverage intensity indicates that the insured amount strongly depends on farms' economic and productive capacity. The positive effects of farm size, agricultural income and credit access on insured amounts suggest that better-endowed farms adopt more sophisticated risk management strategies. These results are consistent with Li *et al.* (2017), who show that resource-rich farms tend to diversify their risk management instruments. Similarly, the positive influence of perceived climate risk and past shock experience suggests that farmers progressively adjust coverage levels according to their exposure. This dynamic aligns with Clarke and Dercon (2016), who view agricultural insurance as a mechanism for reducing uncertainty and encouraging more ambitious investment decisions.

The positive role of institutional networks, particularly cooperative membership and contact with extension services also, confirms the findings of Ricome *et al.* (2017) and Diagne *et al.* (2019), highlighting the importance of rural organisations in promoting financial innovations. Such structures facilitate information access, build collective trust and lower transaction costs associated with insurance subscription.

Overall, the results illustrate a sequential process in which information fosters adoption, experience reinforces trust and economic capacity determines coverage intensity.

These findings suggest that agricultural insurance contributes to income stabilisation and secures investments against climate-related uncertainties.

5. Conclusion and policy implications

This study examines the determinants of agricultural insurance adoption and coverage levels in Senegal, focussing on the roles of product awareness, institutional trust and financial constraints. Drawing on a national survey of 1,200 rural households and employing an econometric approach combining logit, ordered logit and Heckman selection models, the analysis highlights cognitive, economic and institutional mechanisms that shape farmers' insurance decisions.

The findings indicate that awareness of insurance products, education levels and access to credit constitute the primary drivers of adoption, while trust in insurance institutions and prior experience with climate shocks strengthen coverage intensity. Estimated elasticities further reveal that farm size, household income and membership in farmer organisations significantly influence the insured amount. These results suggest that agricultural insurance remains unevenly distributed, favouring farms with greater productive resources and social capital and revealing a structural selection bias disadvantaging smaller producer.

From a theoretical perspective, the findings support recent literature on behavioural and institutional determinants of agricultural risk management, including the studies of Santeramo *et al.* (2024) and Ricome *et al.* (2017). Agricultural insurance emerges not only as a protection mechanism against climate hazards but also as a strategic risk management tool, enabling informed producers to optimise investment decisions and stabilise incomes in a context of increasing climatic variability.

These insights carry several significant policy implications. First, improving access to information is central to boosting insurance demand. Strengthening awareness campaigns, particularly through rural radio and agricultural extension services, could reduce information asymmetries and enhance farmers' understanding of insurance products. Second, financial accessibility remains a critical factor. Expanding premium subsidies and developing integrated insurance-credit schemes, particularly via microfinance institutions and rural financing programs, could facilitate the inclusion of small-scale farms. Third, farmer organisations and cooperatives play a structuring role in insurance dissemination. Their involvement in distribution, training and advisory programs can reinforce institutional trust and improve the effectiveness of insurance schemes.

In this context, consolidating partnerships among agricultural insurance providers, particularly the CNAAS, farmer organisations and agricultural support services, is essential to

Downloaded from ftp.nowpublishers.com/ijse/article-pdf/doi/10.1108/IJSE-04-2026-0381/11823131/ijse-04-2026-0381en.pdf by guest on 05 September 2026

strengthen system efficiency and credibility. Innovations such as index-based insurance, combined with training and financial education programs, could further improve coverage levels and reduce transaction costs.

Beyond climate risk management, agricultural insurance represents a strategic lever for promoting productive investment, enhancing farm resilience and supporting the sustainable transformation of agricultural systems. By stabilising incomes and securing agricultural activities, it contributes to food security and the vitality of rural economies.

Authors contributions

M. N. and S. A. equally contributed in the conception and development of the manuscript. All authors read and approved the final version of the manuscript.

Ethical approval and consent to participate

This article does not contain any studies with human participants or animals performed by the authors.

Data availability statement

The data used for this study are available upon request.

References

Agence Nationale de la Statistique et de la Démographie (ANSD) (2023), *Rapport sur les conditions de vie des ménages: Enquête harmonisée sur les conditions de vie des ménages (EHCVM).* Dakar: ANSD.

Ali, W., Abdulai, A. and Mishra, A.K. (2020), "Recent advances in the analyses of demand for agricultural insurance in developing and emerging countries", *Annual Review of Resource Economics*, Vol. 12 No. 1, pp. 411-430, doi: 10.1146/annurev-resource-110119-025306.

Atozou, B., Lawin, K.G. and Niang, D. (2017), "Impact of weather index insurance on groundnut farmers' technical efficiency in Senegal: a propensity score matching approach", *Journal of Sustainable Development*, Vol. 10 No. 5, pp. 131-142, doi: 10.5539/jsd.v10n5p131.

Bhuiyan, M.A., Davit, M., XinBin, Z. and Zurong, Z. (2022), "The impact of agricultural insurance on farmers' income: guangdong province (china) as an example", *PLoS One*, Vol. 17 No. 10, e0274047, doi: 10.1371/journal.pone.0274047.

Bonou, A., Olapade, M., Garbero, A. and Wantchekon, L. (2023), "Evaluation of the effects of introducing risk management tools in agricultural development: the case of PADAER Senegal", *Agriculture*, Vol. 13 No. 5, p. 989, doi: 10.3390/agriculture13050989.

Cai, J., De Janvry, A. and Sadoulet, E. (2015), "Social networks and the decision to insure", *American Economic Journal: Applied Economics*, Vol. 7 No. 2, pp. 81-108, doi: 10.1257/app.20130442.

Carrer, M.J., Franco da Silveira, R.L., Brandão Vinholis, M.M. and Souza Filho, H.M. (2020), "Determinants of agricultural insurance adoption: evidence from farmers in São Paulo, Braz", *RAUSP Management Journal*, Vol. 55 No. 4, pp. 547-566, doi: 10.1108/RAUSP-09-2019-0201.

Chavas, J.P., Rivieccio, G., Di Falco, S., De Luca, G. and Capitanio, F. (2022), "Agricultural diversification, productivity, and food security across time and space", *Agricultural Economics*, Vol. 53 No. S1, pp. 41-58, doi: 10.1111/agec.12742.

Chen, X. and Zhao, Y. (2024), "Impact of climate risk on agricultural insurance purchasing behaviour of herding households: evidence from Inner Mongolia", *Frontiers in Sustainable Food Systems*, Vol. 8, 1365536, doi: 10.3389/fsufs.2024.1365536.

Cissé, S.O., Anta, S.M.M., Saliou, N., Katim, T. and Sambou, S.P.C. (2025), "Comparative analysis of climatic indices for basis risk reduction in Senegal's crop index insurance", *African Journal of Climate Change and Resource Sustainability*, Vol. 4 No. 2, pp. 335-348, doi: 10.37284/ajccrs.4.2.4055.

Downloaded from ftp.nowpublishers.com/ijse/article-pdf/doi/10.1108/IJSE-04-2026-0381/11823131/ijse-04-2026-0381en.pdf by guest on 05 September 2026

Clarke, D.J. and Dercon, S. (2016), "Dull disasters? How planning ahead will make a difference", *Asia-Pacific Journal of Rural Development*, Vol. 26 No. 2, pp. 116-119, doi: 10.1177/1018529120160206.

Cole, S., Giné, X., Tobacman, J., Topalova, P., Townsend, R. and Vickery, J. (2013), "Barriers to household risk management: evidence from India", *American Economic Journal: Applied Economics*, Vol. 5 No. 1, pp. 104-135.

Compagnie Nationale d'Assurance Agricole du Sénégal (CNAAS) (2023), *Approches de distribution de l'assurance agricole au Sénégal: CNAAS, une expertise unique dans la gestion du risque agricole au Sénégal*, Dakar, Sénégal: CNAAS.

Cramer, J.S. (2003), *Logit Models from Economics and Other Fields*, Cambridge University Press.

Czura, K. and Dequiedt, V. (2015), "Willingness to pay for microinsurance and flexibility: evidence from an agricultural investment lab-in-the-field experiment in Senegal", *Paper Presented at the Verein für Socialpolitik Annual Conference*.

Dang, H.A.H., Hallegatte, S. and Trinh, T.A. (2024), "Does global warming worsen poverty and inequality? An updated review", *Journal of Economic Surveys*, Vol. 38 No. 5, pp. 1873-1905, doi: 10.1111/joes.12636.

Diagne, M., Saito, K. and Diagne, A. (2019), "Determinants of the adoption of agricultural insurance programs: the case of rice in the senegal river valley", *Paper Presented at the 6th African Conference of Agricultural Economists*, Abuja.

Dimara, E. and Skuras, D. (2003), "Adoption of agricultural innovations as a two-stage partial observability process", *Agricultural Economics*, Vol. 28 No. 3, pp. 187-196, doi: 10.1016/S0169-5150(03)00003-3.

Fahad, S., Wang, J., Hu, G., Wang, H., Yang, X., Shah, A.A. and Bilal, A. (2018), "Factors influencing farmers' crop insurance decisions in Pakistan", *Land Use Policy*, Vol. 75, pp. 459-467, doi: 10.1016/j.landusepol.2018.04.016.

FAO (2017), *The Impact of Disasters and Crises on Agriculture and Food Security*, Food and Agriculture Organization, Rome.

Gaurav, S., Cole, S. and Tobacman, J. (2011), "Marketing complex financial products in emerging markets: evidence from rainfall insurance in India", *Journal of Marketing Research*, Vol. 48 No. S1, pp. S150-S162, doi: 10.1509/jmkr.48.spl.s150.

Greene, W.H. and Hensher, D.A. (2010), *Modeling Ordered Choices: a Primer*, Cambridge University Press.

Heckman, J.J. (1979), "Sample selection bias as a specification error", *Econometrica*, Vol. 47 No. 1, pp. 153-161, doi: 10.2307/1912352.

Hill, R.V., Hoddinott, J. and Kumar, N. (2013), "Adoption of weather-index insurance: learning from willingness to pay among rural households in Ethiopia", *Agricultural Economics*, Vol. 44 Nos 4-5, pp. 385-398, doi: 10.1111/agec.12023.

Hou, D. and Wang, X. (2024), "Unveiling the role of agricultural insurance in driving rural industry revitalization in China", *Heliyon*, Vol. 10 No. 14, e34483, doi: 10.1016/j.heliyon.2024.e34483.

Insurance Development Forum (2023), "Implementation update: pioneering an inclusive insurance roadmap in Senegal", *Insdev Forum*, available at: https://www.insdevforum.org/pioneering-an-inclusive-insurance-roadmap-in-senegal/

IPCC (2022), *Climate Change 2022: Impacts, Adaptation, and Vulnerability*, Cambridge University Press, Cambridge.

Issahaku, G. and Abdulai, A. (2020), "Adoption of climate-smart practices and its impact on farm performance and risk exposure among smallholder farmers in Ghana", *Australian Journal of Agricultural and Resource Economics*, Vol. 64 No. 2, pp. 396-420, doi: 10.1111/1467-8489.12357.

Jørgensen, S.L., Termansen, M. and Pascual, U. (2020), "Natural insurance as condition for market insurance: climate change adaptation in agriculture", *Ecological Economics*, Vol. 169, 106489, doi: 10.1016/j.ecolecon.2019.106489.

Downloaded from ftp.nowpublishers.com/ijse/article-pdf/doi/10.1108/IJSE-04-2026-0381/11823131/ijse-04-2026-0381en.pdf by guest on 05 September 2026

Karlan, D., Osei, R., Osei-Akoto, I. and Udry, C. (2014), "Agricultural decisions after relaxing credit and risk constraints", *Quarterly Journal of Economics*, Vol. 129 No. 2, pp. 597-652, doi: 10.1093/qje/qju002.

Li, C.-S., Liu, C.-C. and Zhang, Y. (2017), "Determinants of agricultural household demand for insurance in China from 2004 to 2007", *China Agricultural Economic Review*, Vol. 9 No. 4, pp. 660-667, doi: 10.1108/CAER-08-2017-0154.

Ministère de l'Agriculture et de l'Équipement rural (MAER) (2017), *Rapport annuel du projet d' appui aux politiques agricoles (PAPA), octobre 2016 – septembre 2017*. Dakar, Sénégal, initiative Feed the Future.

Mobarak, A.M. and Rosenzweig, M. (2012), *Selling Formal Insurance to the Informally Insured*, Yale economics department working paper, p. 97.

Mukhopadhyay, P., Sinha, M. and Sengupta, P. (2019), "Determinants of farmers' decision to accept crop insurance", in Nayak, J., Swapnarekha, H., Routray, A.R., Nayak, S.R. and Behera, H.S. (Eds), *Soft Computing in Data Analytics*, Springer, Singapore.

Park, S., Goodwin, B.K., Zheng, X. and Rejesus, R.M. (2020), "Contract elements, growing conditions, and anomalous claims behaviour in U.S. crop insurance", *The Geneva Papers on Risk and Insurance - Issues and Practice*, Vol. 45 No. 1, pp. 72-98, doi: 10.1057/s41288-019-00143-9.

Ricome, A., Affholder, F., Gérard, F., Muller, B., Poeydebat, C., Quirion, P. and Sall, M. (2017), "Are subsidies to weather-index insurance the best use of public funds?", *Agricultural Systems*, Vol. 156, pp. 149-176.

Ricome, A., Louhichi, K. and Gomez-y-paloma, S. (2020), "Subsidizing agricultural inputs in Senegal: comparative analysis of three modes of intervention using a farm household model [Subvention des intrants agricoles au Sénégal: analyse comparative de trois modes d'interventions à l'aide d'un modèle de", Working Papers hal-03966102, HAL.

Ruan, P., Yin, S. and Zhang, Y. (2024), "The impact of agricultural insurance on consumer food safety: empirical evidence from provincial-level data in China", *Frontiers in Nutrition*, Vol. 11, 1392711, doi: 10.3389/fnut.2024.1392711.

Santeramo, F.G. (2018), "Imperfect information and participation in insurance markets: evidence from Italy", *Agricultural Finance Review*, Vol. 78 No. 2, pp. 183-194, doi: 10.1108/afr-06-2017-0053.

Santeramo, F.G., Lamonaca, E., Maccarone, I. and Tappi, M. (2024), "Extreme weather events and crop insurance demand", *Heliyon*, Vol. 10 No. 7, e27839, doi: 10.1016/j.heliyon.2024.e27839.

Syll, M.M.A. (2021), "Renewal of crop index-based insurance uptake: evidence from Senegal", *Open Journal of Social Sciences*, Vol. 9 No. 11, pp. 1-8, doi: 10.4236/jss.2021.911001.

Syll, M.M.A. and Weingärtner, L. (2017), "Disposition à payer l'assurance agricole basée sur les indices climatiques au Sénégal", *Revue Française d'Economie*, Vol. 32 No. 3, pp. 18-45, doi: 10.3917/rfe.173.0018.

UNDP (2024), *Inclusive Insurance and Risk Financing in Senegal: Snapshot and Way Forward 2024*, United Nations Development Programme, New York.

Was, A. and Kobus, P. (2018), "Factors differentiating the level of crop insurance at Polish farms", *Agricultural Finance Review*, Vol. 78 No. 2, pp. 209-222, doi: 10.1108/afr-06-2017-0054.

Wen, S.S., Xiao, Q. and Li, J. (2023), "The impact of agricultural insurance on urban–rural income gap: empirical evidence from China", *Agriculture*, Vol. 13 No. 10, p. 1950, doi: 10.3390/agriculture13101950.

Xiao, Y.P., Zhang, Y., Wen, C.C., He, Q. and Xia, X. (2022), "Does digital financial inclusion narrow the urban-rural income gap? Evidence from prefecture-level cities in China", *Transforming Business and Economics*, Vol. 21 No. 2B, pp. 792-815.

Xie, S.H., Zhang, J.Z., Li, X.J., Xia, X.L. and Chen, Z. (2024), "The effect of agricultural insurance participation on rural households' economic resilience to natural disasters: evidence from China", *Journal of Cleaner Production*, Vol. 434, 140123, doi: 10.1016/j.jclepro.2023.140123.

Downloaded from ftp.nowpublishers.com/ijse/article-pdf/doi/10.1108/IJSE-04-2026-0381/11823131/ijse-04-2026-0381en.pdf by guest on 05 September 2026

Zhou, C., Liu, J., Wan, S., Zheng, H. and Chen, S. (2023), "Agricultural insurance and rural revitalization—an empirical analysis based on China's provincial panel data", *Frontiers in Public Health*, Vol. 11, 1291476, doi: 10.3389/fpubh.2023.1291476.

Zubor-Nemes, A., Fogarasi, J., Molnár, A. and Kemény, G. (2018), "Farmers' responses to the changes in Hungarian agricultural insurance system", *Agricultural Finance Review*, Vol. 78 No. 2, pp. 275-288, doi: 10.1108/afr-06-2017-0048.

Corresponding author
Simplice Asongu can be contacted at: asongus@afridev.org

For instructions on how to order reprints of this article, please visit our website:
www.emeraldgrouppublishing.com/licensing/reprints.htm
Or contact us for further details: **permissions@emeraldinsight.com**

Downloaded from ftp.nowpublishers.com/ijse/article-pdf/doi/10.1108/IJSE-04-2026-0381/11823131/ijse-04-2026-0381en.pdf by guest on 05 September 2026