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Understanding financial risks for smallholder farmers in low-and middle-income countries: what do we know and not know?

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International Initiative for Impact Evaluation

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About this paper

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Summary

Ninety-eight per cent of the world's hungry people live in low- and middle-income countries, and four in five of them are involved in food production. Key obstacles preventing the rural poor from escaping poverty – the majority of whom are involved in agriculture – are their vulnerability to risks and their inability to cope with shocks. Governments around the world have proposed, piloted and implemented many financial agricultural risk management (FARM) instruments to help smallholder farmers cope with these risks. However, it remains unclear whether risk mitigation and coping policies, such as insurance mechanisms, have improved the welfare or overall well-being of smallholder farmers.

This background paper examines what we know about the efficacy and effectiveness of FARM instruments for smallholder farmers in low- and middle-income countries. We had four main objectives:

- Identify areas where high-quality evidence exists on the efficacy and effectiveness of FARM instruments, including if and how they help smallholder farmers mitigate, diversify and transfer agricultural risk;
- Understand how, why and in what contexts impact occurs or fails to occur;
- Assess what additional evidence may be useful for policymakers, programme managers and practitioners; and
- Identify what questions researchers could usefully pursue to support evidence-informed policies and programmes.

This scoping work helped inform the development and focus of 3ie's grant-making window on agricultural risk. We used a number of tools to inform this work. First, we developed a theory of change that helped us identify key underlying theories and assumptions that inform the causal pathways that link FARM instruments to improved smallholder farmer welfare. Second, we developed an evidence gap map, which identifies studies relevant to the overall theory of change. Third, we undertook an online survey to understand key areas where we need evidence about FARM instruments. Fourth, we conducted semi-structured interviews with a dozen key stakeholders, researchers, policy advisers and practitioners to get their in-depth perspectives on evidence needs related to FARM programmes and interventions.

We found 57 impact evaluation studies and 2 systematic reviews between and including 1995 and 2015 that examined questions related to FARM instruments and their adoption in developing countries. However, evidence is skewed, with some instruments and outcomes receiving more attention than others. This paper highlights FARM instruments as a missed opportunity. Although there is significant interest from the private sector and governments of developing countries in using them to help diversify, mitigate and transfer risks for smallholder farmers, their adoption has been low.

Almost all high-quality research acknowledges that the challenges of low adoption, uptake and renewal levels influence the effectiveness of these instruments. There are likely many reasons for this, including non-recognition of informal exchange economies and social networks; social norms; lack of access to markets; lack of information; poor design; and possible lack of trust caused by, among other reasons, high basis risk.

Some researchers have examined these constraints and tried to study intervention impacts while controlling for the context. Based on this scoping exercise, we suggest that greater attention be paid to understanding the barriers to uptake in each specific study context and the use of techniques to address these constraints and encourage the adoption of FARM instruments.

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List of figures and tables

Abbreviations and acronyms

EGM	Evidence gap map
FARM	Financial agricultural risk management
L&MICs	Low- and middle-income countries
RCT	Randomised controlled trial

1. Introduction

How do smallholder farmers cope with risk? To what extent does risk insurance help farmers? To what extent can markets help smallholder farmers mitigate their risks? To what extent do smallholder farmers find it useful to buy insurance? Given the increased variability of weather patterns, to what extent can risk instruments help smallholder farmers, who otherwise have inadequate access to formal markets, reduce their vulnerability? What is the effectiveness of risk instruments that are meant to diversify, transfer and mitigate risks for smallholder farmers, for farmers' welfare? Alternatively, to what extent do smallholder farmers depend on social networks and informal risk-sharing and risk-reducing mechanisms for support? To what extent do market-based risk instruments substitute for – or add to – existing non-market risk-reducing mechanisms? How?

These are some of the questions that this paper seeks to investigate through a review of impact evaluation evidence. In rural areas in low- and middle-income countries (L&MICs), agricultural risks pose a considerable threat to the well-being and development of households. A key reason for this is the inability of smallholder farmers to mitigate, diversify and transfer risks and to plan for the longer term because they lack access to markets and cannot plan optimally for vulnerability and shocks.

To respond to these limitations and deal with the vagaries of weather and market-related and other shocks, which may or may not be anticipated, many organisations around the world have proposed, piloted and implemented financial agricultural risk mitigation (FARM) programmes to help smallholder farmers cope with these agricultural risks.

In this paper, we identify such programmes and strategies. However, it remains unclear whether FARM instruments, when used, improve farmer welfare, provide reasonable social protection or offer a good way to manage on-farm risks. Most FARM instruments are subsidised by either the government or the private sector. Therefore, it is unclear if and how insurers and implementing organisations can achieve their objectives of profit maximisation and sustainability in smallholder farming contexts.

Literature suggests that studies show that these programmes often encounter implementation challenges that make it methodologically challenging to determine if agriculture risk mitigation has successfully affected positive outcomes for the farmer or the insurer in the longer run (Cole et al. 2012). Furthermore, the lack of long-term, pre- and post-intervention data limits the ability of studies to capture impacts adequately.

The overall objective of this scoping study is to take stock of high-quality impact evaluation evidence on FARM instruments in L&MICs to help inform decision-making about 3ie grant-making in this area and guide future research. We had four objectives:

- Identify areas where high-quality evidence exists on the efficacy and effectiveness of FARM instruments, including if and how they help smallholder farmers mitigate, diversify and transfer agricultural risk;
- Understand how, why and in what contexts impact occurs or fails to occur;
- Assess what additional evidence may be useful for policymakers, programme managers and practitioners; and

- Identify what questions researchers could usefully pursue to support evidence-informed policies and programmes.

The remainder of this paper is structured as follows. In Section 2, we set out the methodology we used in this scoping exercise and its limitations. In Section 3, we explain the overall theory of change framework, and in Section 4 we summarise the evidence gap map (EGM). In Section 5, we present our findings, which we discuss in Section 6, where we also draw our conclusions.

2. Methodology and limitations

2.1 Scope

In this scoping study, we concentrate on financial instruments for risk management in agriculture that aim to reduce vulnerability and increase resilience before, during and/or after an adverse event, by transferring, mitigating and diversifying risk so farmers can cope with agricultural losses and reduce the magnitude of negative shocks. The agricultural risks we consider in this paper are restricted to production and on-farm risks. We include conventional risk pooling and transfer mechanisms (such as insurance products).

We examine both the demand for FARM instruments – in other words, the farmer operating at the micro level – and the supply of FARM instruments, such as banks, insurance providers, agribusinesses, input providers and self-help groups (Figure 1). We include savings and credit products that are bundled with risk management products, since they are designed to reduce vulnerability. We also investigate a variety of risks faced by smallholder farmers, including financial, climate and disaster risks. We do not include risks further along the value chain, such as price and market risks.

Figure 1: Relationships between different actors

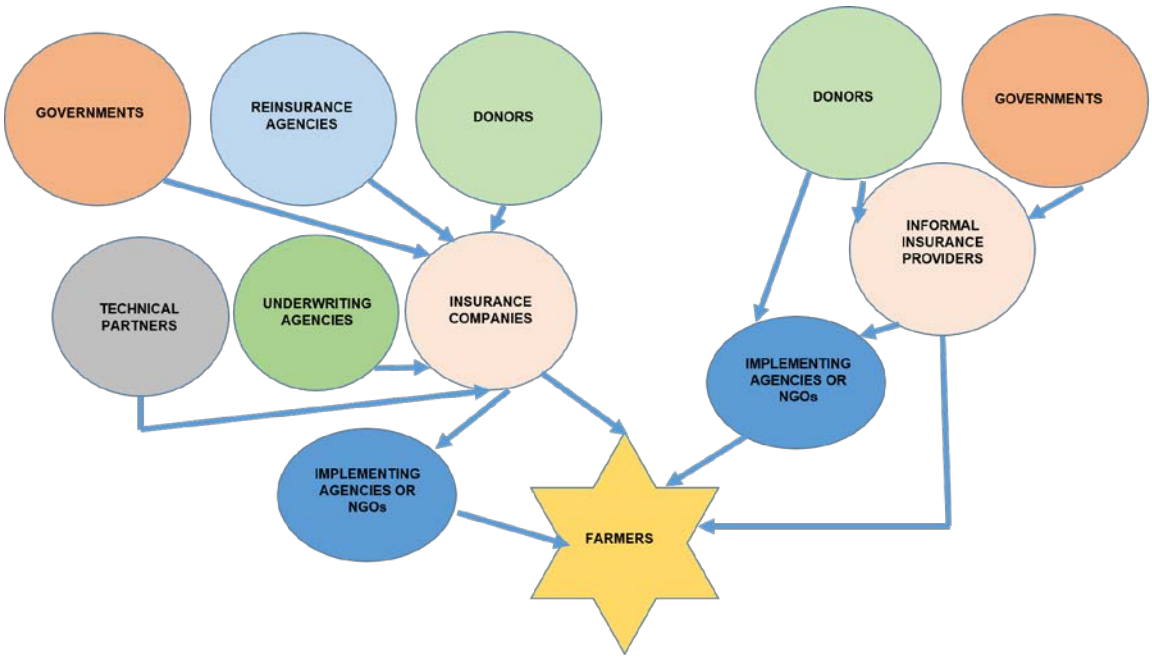


Figure 2 is a Venn diagram displaying the scope of the study. The blue areas represent the focus of this scoping study. The interventions relevant for this scoping study consist of pure agricultural insurance products (e.g. crops and livestock insurance) and interventions that lie at the intersection of at least two of the following areas:

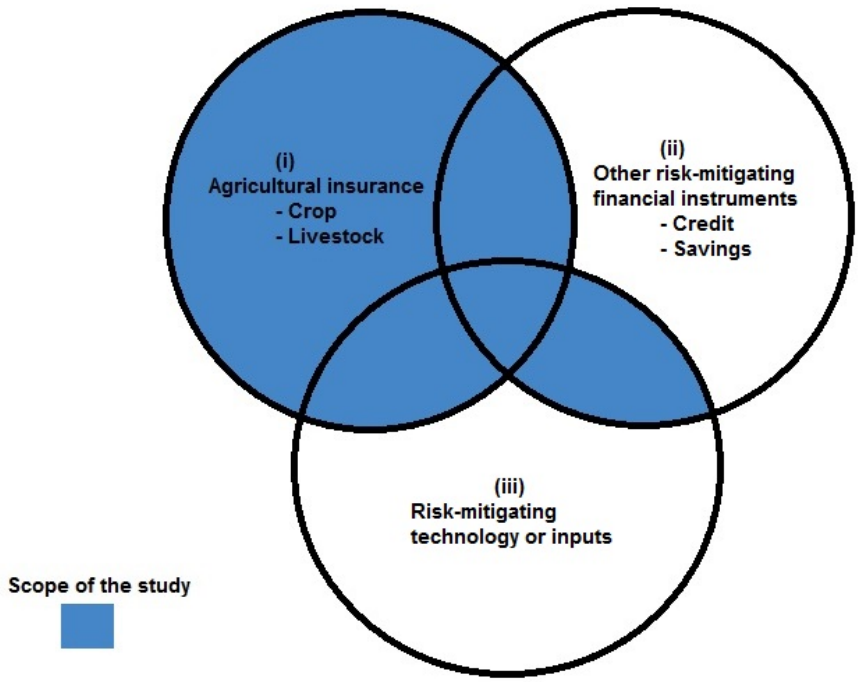
i. Formally provided agricultural insurance;
ii. Formal and informal financial instruments that aim to improve coping ability with agricultural shocks, such as credit, savings and informal village savings groups; and
iii. Agricultural risk-management technology inputs.

Here are examples of interventions that lie at the intersection of these areas:

- Between (i) and (iii) include those that offer crop insurance and provide weather forecasts through mobile phones;
- Between (i) and (ii) include loans to promote investments in measures that reduce vulnerability to shocks, bundled with insurance products; and a microinsurance product designed for a rotating savings and credit association;
- Between (ii) and (iii) include state-contingent loans for drought-resistant seeds to decrease farmers' vulnerability and exposure to shocks; and
- Between (i), (ii) and (iii) include state-contingent input loans that are backed by insurance companies, such as those subscribed to by a microfinance institution that offers loans that promote investment in irrigation, bundled with insurance that aims to reduce the risk of investment.

In this study, we examine factors that affect both the supply and demand for FARM instruments that lie in the blue areas of Figure 2.

Figure 2: Venn diagram showing FARM interventions covered by this study



2.2 Methods

We use four types of approaches to identify, map, analyse and present the studies and consultations for this paper: a theory of change, an EGM, a stakeholder consultation and an online expert survey. We discuss each of them below.

We developed a **theory of change** that uses existing literature and in-depth discussions with key stakeholders and participants in different workshops that we held. A theory of change explores the sequence of causal links hypothesised to contribute to outcomes and overall impact. The links themselves are informed by different theories (e.g. behavioural, market and information, pricing, and labour market). Our theory of change also explains the underlying assumptions behind these causal links. These help us develop overall hypotheses around key mechanisms through which we expect outcomes and impact to be realised. Subsequently, this also helps us to outline an overall framework for the EGM and examine how, why and in what contexts outcomes and impact occur.

The **EGM** takes stock of existing evidence according to the type of intervention and range of outcomes. Using the EGM graphical framework, we identify intervention and outcome intersections that have evidence to inform them as well as intersections for which evidence is absent or sparse. The EGM displays the evidence in a matrix with rows that show categories of interventions and columns that categorise outcomes. We also assessed each impact evaluation study for risk of bias.

We conducted our **stakeholder consultation** through semi-structured interviews with key stakeholders in the field of FARM programmes and exchanges with researchers and implementers during the inception workshop in Nairobi for the 3ie agriculture risk insurance grant window. These interviews gave us the opportunity to obtain expert knowledge on the opportunities and challenges that arise in planning and implementing FARM programmes. They also allowed us to verify key links in the theory of change and understand important evidence gaps and needs. We interviewed 12 respondents from leading institutions, organisations and universities working in this field. The interview guide is available in online Appendix A; the full agenda for the 3ie inception workshop is available in online Appendix B.

Our **online expert survey** aimed to identify concerns about evidence and evidence use in this area, in depth. We sent the survey to 444 selected implementers, practitioners and researchers who had either worked in, done research on or were implementing FARM programmes. Of these, 69 individuals responded (between 15 February and 6 April 2016). The sample is balanced between researchers (34) and implementers or practitioners (35). The survey is available in online Appendix C.

Table 1 shows the inclusion and exclusion criteria we used to screen the studies and reviews for the EGM. We excluded (a) studies that assess agricultural risks but are not directly related to dealing with production risk, including studies that consider ways to mitigate price risks; (b) those that assess contract farming and reduce market-related risks, including those related to transportation, logistics and general infrastructure; and (c) those dealing with political and institutional risks. We also excluded lab experiments, lab-in-the-field and behavioural experiments that use games and simulations to test

hypotheses constructed by researchers. Nor did we consider papers that study technical attributes of products (such as testing different insurance indices) but do not look at outcomes of the intervention in terms of their impact on beneficiaries.

Table 1: Inclusion and exclusion screening criteria

	Included	Excluded
Target population	Smallholder farmers in L&MICs	Studies focusing on non-rural population
Intervention type (short-term or long-term)	Financial instruments for risk reduction in agriculture (e.g. crop, livestock and disaster insurance and financial instruments bundled with risk-mitigation technologies) FARM instruments bundled with other types of insurance (e.g. health insurance)	Non-financial risk mitigation Non-agricultural risk (e.g. health and life insurance) Macro-level interventions Studies focusing only on price risk, contract farming and market-related risk, and political and institutional risk Lab experiments, lab-in-the-field behavioural experiments
Outcomes	Behaviour (e.g. savings, investment) and welfare outcomes (e.g. consumption or education) Productivity and cropping patterns Evidence on demand (take-up and renewal rates) and supply	Evidence on (hypothetical) willingness to pay for insurance and laboratory experiments Papers that only examine technical attributes of the product
Data	Quantitative survey data Secondary data	Studies that only use qualitative data
Study design	Robust impact evaluations using a rigorous identification strategy and valid counterfactuals (e.g. experimental, quasi-experimental, difference-in-difference, regression discontinuity designs, propensity score matching, instrumental variables, multivariate regressions with fixed effects) Systematic reviews	Correlational analyses Cross-sectional evidence with endogenous programme placement and no control for confounding Literature reviews not done systematically
Timing of the study	Peer-reviewed, published and working papers Studies published in a peer-reviewed journal published in or after 1995 Ongoing studies not published in a peer-reviewed journal written and made available after 2011 A select set of policy briefs and monitoring and evaluation reports of FARM programmes to inform insights around our theory of change	Studies published in peer-reviewed journals before 1995 Personal drafts or memos Conference presentations

2.3 Limitations

The EGM only shows available evidence that satisfied our inclusion criteria. We searched only English-language terms and for impact evaluations and systematic

reviews. Our evidence search, analysis and mapping did not explicitly use any recognised frameworks for identifying gendered inequalities and vulnerabilities.

Because 3ie EGMs look only at impact evaluations and systematic reviews, they are a good way to present outcomes and interventions that are salient (and so have made their way into a framework), but may not include outcomes and interventions that are not studied sufficiently in the rigorous way that we are demanding.

3. Theory of change for FARM programmes

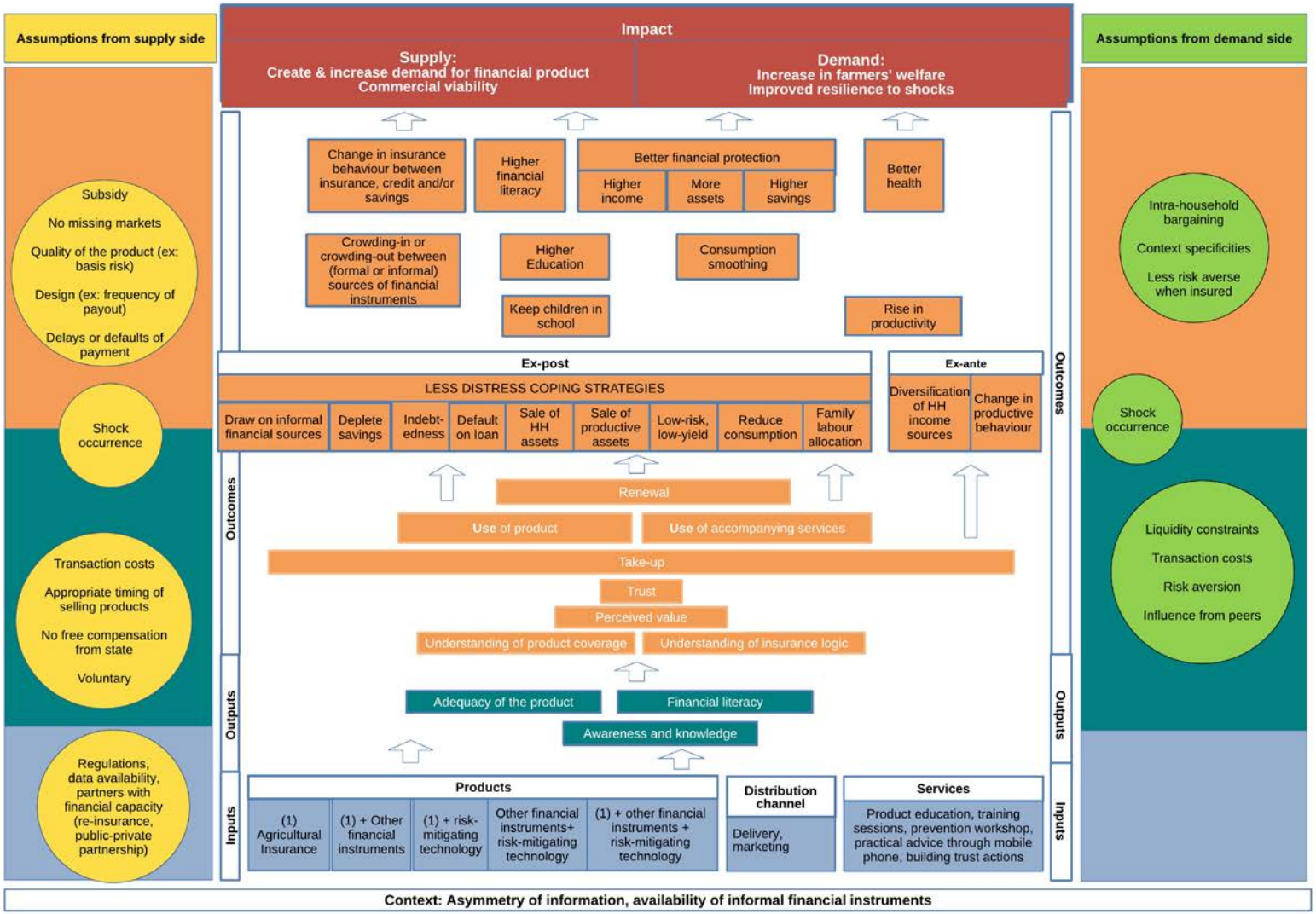
Pathways that link interventions to impact are complex, and understanding the underlying mechanisms that inform expected intermediate and ultimate effects can be very useful. A theory of change allows us to think sequentially about this causal pathway. The intermediate steps and assumptions behind causal links inform ex-ante hypotheses. These guide us to understand how, when and why programmes are effective.

In this section, we construct and describe an overall theory of change for FARM interventions (Figure 3). We used existing literature (De Bock and Ontiveros 2013; De Janvry et al. 2013; Dercon 2008) and insights from practitioners to construct and verify these links.[1]

The chart in Figure 3 should be read from the bottom to the top. We use colour to distinguish between inputs, outputs, outcomes and long-term impacts and list assumptions related to the supply and demand of agricultural risk insurance on respective sides of the diagram. We discuss the chart briefly in the sections that follow.

[1] We also considered advice from interviewees and stakeholders and feedback from the Nairobi workshop participants to explain, understand and verify these links.

Figure 3: Theory of change framework



3.1 Context of the smallholder farmer in L&MICs

The lower-most box of the theory of change figure (Figure 3) is 'context', which plays a significant role. For FARM programmes, we distinguish between two types of contextual variables: proximate and immediate.

Proximate contextual variables include levels of poverty, education, soil quality, climate, remoteness, social structures and peer group effects. They are important because they influence the effectiveness of most programmes and linkages and affect most other relationships and programmes.

Immediate contextual variables are specific to FARM programmes and affect the state of their effectiveness. They include asymmetry of information (Besley 1995) and available (and alternative) informal financial instruments, such as remittances (Manje and Churchill 2002).

3.2 Types of inputs

The next row up in Figure 3 is where we account for inputs that influence, inform or determine how FARM instruments are designed and supplied (Dalal et al. 2014). These include products, goods and services, such as agricultural insurance and bundled products, as well as inputs into building and strengthening delivery and marketing channels and services to increase awareness among farmers.

3.3 Immediate outputs[2]

Figure 3 distinguishes between three types of outputs that FARM programme implementers may aim to deliver with their products and services:

- Awareness and knowledge, such as familiarity with the concepts of risk reduction and risk pooling (Panda et al. 2015);
- Specific financial literacy, such as the ability to understand how financial instruments work and how to choose the best option (Gaurav et al. 2011); and
- Products and services that bundle financial risk-mitigating instruments to offer adequate, context-specific protection for farmers, covering production and on-farm risks. Increased interaction with farmers and piloting of products and services would ensure that these are adequately designed (Hill and Robles 2011; Jensen et al. 2014).

3.4 Outcomes[3]

FARM programmes and policies typically target a variety of outcomes. We distinguish between two levels of outcomes. First-level outcomes are those that lead to increased uptake and use of FARM products and services. Second-level outcomes are changes that occur as a result of increased take-up and use of FARM products and services.

[2] Outputs are direct results of (the use of) products and services. Outputs are directly under the control of the programme's implementers.
[3] Outcomes are the effects or behavioural or attitude changes resulting from programme outputs. Outcomes result from actions taken by the target population.

3.4.1 First-level outcomes

It is critical for first-level outcomes that potential policyholders understand the insurance product and coverage and, more broadly, insurance as a concept. We hypothesise that, since the concept of insurance is not easy to grasp, it is only once people understand it that they adopt it. The value that farmer clients see in the product is critical in determining both the type of instrument and its quantity.

Field studies have also shown that trust in both the product and the provider is crucial in determining enrolment in insurance programmes (Cole et al. 2013; Dong et al. 2009; Giné et al. 2008; Basaza et al. 2008; Matul et al. 2013).

All of these outcomes – increased understanding of the product, recognising value, and trust in the insurance agent and agency – are important in determining the uptake of FARM products and services (Miranda and Farrin 2012; Binswanger-Mkhize 2012).

3.4.2 Second-level outcomes

We classify farmer response to uptake of risk-mitigating products into ex-ante and ex-post strategies. Ex-post strategies are risk-coping actions at household and farm levels after a production shock. For example, FARM products and services may lead to a reduced need to draw on informal financial sources, as users are less likely to deplete their savings. Users are also less likely to be unable to repay loans, leading to lower levels of indebtedness, fewer defaults on loans and fewer distress sales of household assets. They are also less likely to reduce daily consumption or to mobilise family labour, in particular, children. We also expect to see changes to patterns family labour allocation.

Ex-ante strategies are risk-mitigating actions that are adopted irrespective of whether a shock occurs. Such strategies include decisions to diversify household income sources – for example, switching to multi-cropping from specialisation – even when an adverse event does not occur. The arrow from uptake directly to the ex-ante outcomes on the far right of Figure 3 indicates this possibility.

We therefore hypothesise that farmers who adopt FARM instruments are less likely to opt for low-risk, low-yielding crops and more likely to change their (seasonal) migration behaviour. Another risk-mitigating outcome is the increase in productive investment, such as buying pesticides or better seeds.

3.5 Assumptions

On the demand side, various factors can influence uptake. Liquidity constraints may impede farmers from buying the product or paying the premium. Personal profiles and a farmer's perception of risk (in other words, their level of risk aversion) also play a role in their choice to enrol in agricultural insurance. Uptake may also differ between men and women, while awareness of weather vagaries, expectations of unanticipated variability and peers are also likely to influence uptake decisions (Giné et al. 2008).

On the supply side, the ease of verifying insurance claims affects the purchase of (indemnity) insurance. Delivery time and channels for insurance products are also crucial for take-up. For example, in rural India, the best period for suppliers to sign up prospective policyholders is often restricted to a small post-harvest window. Transaction costs affect both supply and demand, as they increase the product cost, explicitly and

implicitly. All of this assumes that purchasing FARM products is voluntary. Indeed, if insurance schemes are compulsory or bundled with other necessary products (e.g. some insurance is mandatory when subscribing a loan in India) the uptake of the FARM product is likely to be independent of several of the variables discussed here.

The commercial viability or the quality of the product offered is another key assumption. For example, if we consider an index-based insurance scheme, quality will be ensured through a strong correlation between the actual loss and the index triggering the payout: in other words, by low levels of basis risk.

Similarly, the frequency of payouts plays a key role in influencing uptake, while quick claim settlement is a crucial factor in inspiring trust and take-up (Karlan and Morduch 2009). Indeed, payment delays or defaults may hinder the sequence in the causal chain of FARM processes or products. In many countries, informal markets and subsidies are often required for FARM products to be adopted.

Our corresponding EGM report has a detailed analysis of the assumptions underlying our theory of change. Online Appendix D has a list of insurance-related definitions.

3.6 Impact

We argue that the ultimate impact of increased uptake of FARM products and services is a reduction in vulnerability, improved resilience to shocks and an increase in farm families' welfare. We also posit that all of these changes increase the commercial viability and sustainability of FARM products, and contribute to creating and strengthening markets for these products.

4. Evidence gap map

In this section, we summarise the main information from our EGM. We used the theory of change discussed in Section 3 to construct the EGM framework. The full report on the EGM and the interactive map are available on our website.

One of the strengths of EGMs is that they visually display the density of the existing evidence in a matrix of intervention categories (rows) and outcome indicators (columns) along the causal chain (Snilstveit et al. 2017). Another key feature of the interactive online map is that it provides links to the included studies that met our inclusion and exclusion criteria (Table 1). Table 2 lists and describes the categories of FARM interventions and the outcomes included in this study.

Table 2: Categories of included FARM interventions

Categories of FARM interventions	Brief description and examples
1. Formal financial risk management products	Finance from banks and other formal sources
• Formal yield indemnity insurance	Based on the actual average yield of an area, payout occurs when the average yield for the area is less than the insured yield
• Index insurance	Benefits paid out on the basis of a predetermined index (e.g. rainfall level)
• Formal agricultural risk-related credit	Loans, microfinance
• Formal agricultural risk-related savings	Deposits
• Direct subsidy, grant or transfer	E.g. cash transfers
2. Informal risk management financial products	Finance from non-banks, including gifts, rotating savings and credit associations
3. Agricultural technology or inputs	E.g. irrigation technology
4. Social protection schemes	E.g. India's national rural employment guarantee scheme
5. Bundled insurance	Combination of FARM insurance products with other products (e.g. health insurance)
6. Innovative or improved product	E.g. M-PESA, other mobile money
7. Other products	Self-help group savings
8. Services	
• Financial literacy or product training	Includes awareness and/or marketing campaigns
• Financial advice	Advice on finance-related matters
• Other services	

Table 3 lists and describes the indicators included studies use to examine the effects of FARM products and services. We grouped these as outputs, first-order outcomes, other outcomes, second-order (short- and medium-term) outcomes, impacts or long-term outcomes, and heterogeneous effects.

The first group of outcomes is related to variables that inform demand and supply for FARM products. This includes studies that investigate uptake and renewal rates, the use of product and extension services, and trust.

Under other outcomes, we included studies that examine cost-benefit, cost-effectiveness, and loss ratios and variables that affect both the demand and the commercial viability (and therefore supply) of FARM products and services. Although we do not discuss these factors separately, we recognise that studies examine these outcomes and that they contribute in important ways to understanding the uptake, use and effects of FARM products and services.

We split short- and medium-term outcomes into different categories, including those that measure changes in risk-coping strategies, access to and use of financial instruments, and risk-reducing household production decisions.

To understand long-term impact, we examined whether included studies investigate changes in household welfare and whether and how studies investigate changes in indicators that are proxies for welfare, such as health, education and income.

Finally, we looked at whether studies examine heterogeneous effects separately across different and important subpopulations, including – but not restricted to – smallholder male and female farmers.

Table 3: Outputs and outcomes measured in included studies

Output, outcome or effect outputs	**Indicator**
Product adequacy	Whether the product works or adequately addresses risks
Financial literacy	Beneficiary understanding of product's financial component
Awareness and understanding	Basic awareness and understanding of risk mitigation
First-order outcomes	
Trust	Changes in level of trust in the product, service and provider
Take-up demand	Changes in level of take-up of the product (e.g. percentage of farmers buying insurance; number of units of insurance bought)
Use of product and services	Whether the service or product is used (e.g. did farmers who bought insurance claim any payouts?)
Renewal	Whether the target population renews the product or service
Other outcomes*	
Costs and benefits	The monetary worth of the intervention: total project costs versus project benefits in monetary terms
Cost-effectiveness	Comparison of the relative costs or monetary inputs of two or more interventions and the (desired) outcome or impact effects
Loss ratio	Total losses paid by an insurance company as claims
Second-order outcomes (short- and medium-term outcomes)	
Change in ex-post risk-coping strategies	Use of informal financial sources, levels of indebtedness, levels of productive assets, changes in consumption levels, adoption of low-risk-low-yield strategies, loan default levels, changes in savings levels, cropping patterns, mobilisation of family labour
Changes in access and use of financial instruments	Loans, savings, informal financing
Changes related to ex-ante household production decisions	Decisions regarding farm-level investments, household assets, inputs, cropping patterns Changes in productivity, yield and consumption levels
Impacts (long-term outcomes)	
Welfare-level outcomes	Levels and changes in food consumption, non-productive assets, family labour (including child labour and migration)
Proxies for welfare	Levels and changes in income, health and education
Heterogeneous effects	
Minority groups	Smallholder male farmers, female farmers

Note: * We do not discuss these factors separately.

5. Findings

In this section, we present the main findings and highlight the evidence gaps we identified from the EGM exercise, the online survey and the interviews.

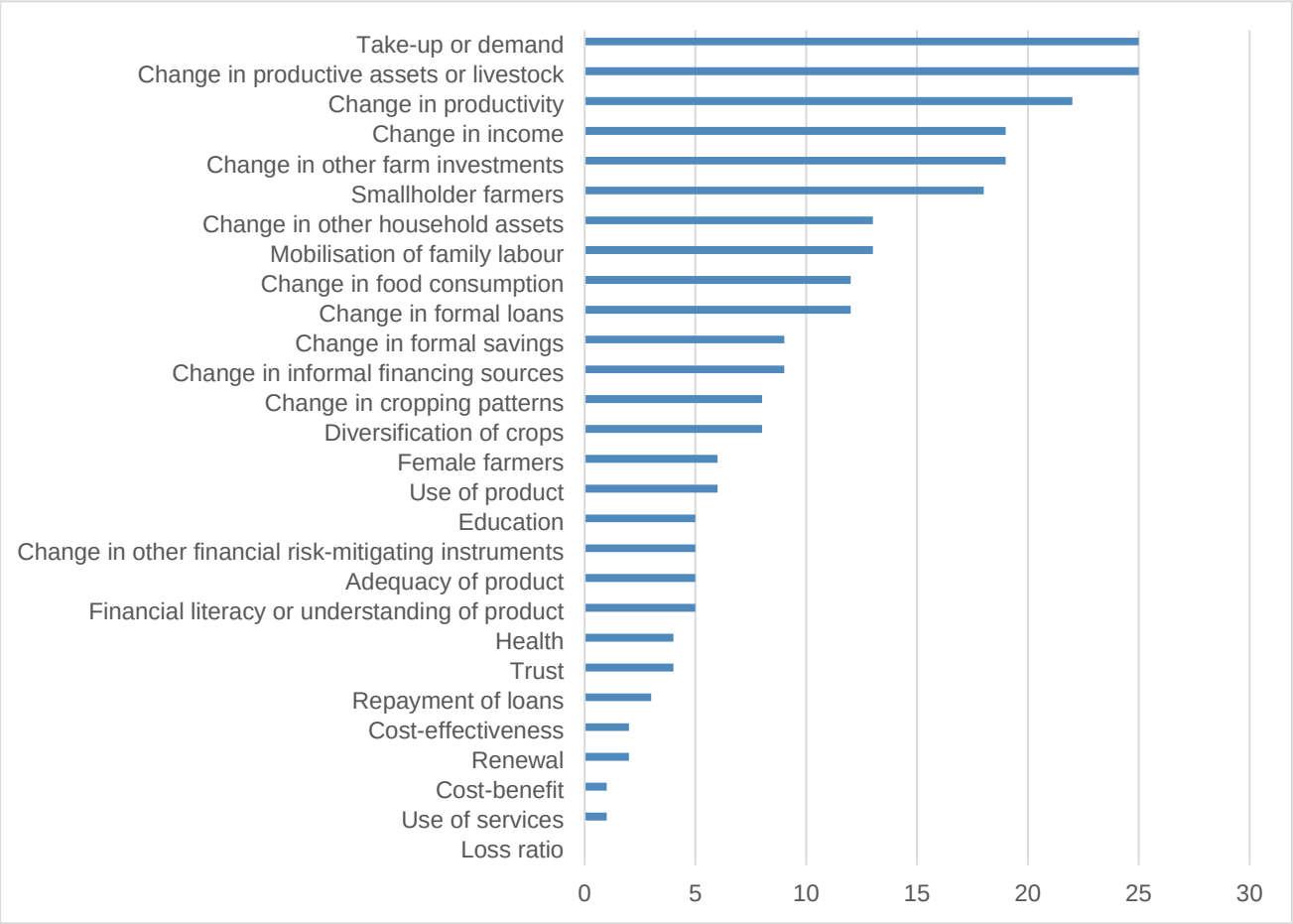
5.1 EGM results

Below is a summary of the results from the EGM. A detailed analysis of the results and identification strategy can be found in the full EGM report on 3ie's website:

- Fifty-seven impact evaluation or primary studies, and two systematic reviews, met our inclusion criteria.[4]
- Formal risk management products are the dominant studied intervention type. In particular, index insurance has received much attention (24 of 59 studies, or 40%).
- Studies covered 21 L&MICs. Interventions are highly concentrated in Sub-Saharan Africa and South Asia.
- Twenty-five of the 57 studies examine uptake and demand for financial agricultural risk-mitigating instruments. A number of studies look at two other immediate outcomes: 12 study the impact of FARM on access to and use of formal loans and savings; and 9 focus on how access to and use of informal financing changes as a result of FARM. Figure 4 provides a full list of outcomes.
- There are two reasons why very few studies examine outcomes further along the causal chain (such as impacts on health and farm management strategies). First, it is possible that most studies are not concerned about longer-term outcomes and are much more concerned about uptake and demand. Second – and this is more likely – it is possible that low uptake has constrained researchers from examining outcomes further along the causal chain. Low uptake makes it difficult for researchers to have adequately powered samples.
- There is a clear increase in the number of studies over time. This reflects an increased attention to risk-coping technologies, such as index insurance, over time.
- Randomised control trials (RCTs) are the most prominent study design. More than half of the studies employed randomised assignment to understand the effect of FARM instruments on various outcomes.

[4] We could not obtain 10 reports among the 241 reports for which the full text was screened for inclusion or exclusion. Since mapping does not include full-text appraisal, it did not affect whether or not they were included.

Figure 4: Unique impact evaluations (n = 57) by outcomes studied



5.1.1 Findings from systematic reviews

We included two systematic reviews in this study, both of which we critically assessed for quality using 3ie's critical appraisal tool.

The first (Cole et al. 2012) includes 13 studies produced since 1990 in L&MICs and focused specifically on studies that assessed the effects of index-based insurance on low-income households – particularly weather insurance and area yield-index crop insurance – and their impact on household investment decisions, household well-being and take-up.

Cole and colleagues' main finding is that the adoption of formal agricultural insurance is low, despite insurance mostly being provided at subsidised rates. Their other findings suggest that higher liquidity and income levels are positively associated with take-up of insurance; a lower level of income diversification is positively associated with demand for insurance; and financial literacy is positively correlated with interest in weather insurance. Surprisingly, higher levels of risk aversion are associated with lower demand for index-based microinsurance. There is some, albeit mixed, evidence that access to index-based insurance increases the use of agricultural inputs, such as fertiliser. The review highlights substantial gaps in the literature on the take-up and impact of index-based microinsurance.

The second is a systematic narrative literature review of microinsurance (Apostolakis et al. 2015). It includes 64 studies that examine the financial performance and social impact of microinsurance on the well-being of the poor. It includes peer-reviewed articles from 1990 to 2014 and excludes studies that do not make direct reference to the search term 'microinsurance'. It also excludes discussion papers, conceptual or review papers, and/or those that used non-experimental methods. The authors find that microinsurance reduces the vulnerability of the poor and helps them overcome poverty. The main pathway of these effects is through increased access to healthcare services and an indirect effect on the household's economic status.

5.1.2 Methods used in included impact evaluation studies

In this subsection, we discuss the methods used in the 57 impact evaluations included in the EGM.

Identification methods Table 4 shows that 31 studies use randomised assignment, while the remaining 16 use quasi-experimental methods to identify and measure the causal change attributable to FARM instruments. Those using quasi-experimental methods use either matching methods, instrumental variables, double difference or multivariate regression with fixed effects.

Table 4: Included impact evaluations categorised by identification strategy

Study design type	Number of studies
Difference-in-difference (two used matching, one did not)	3
Instrumental variables	7
Multivariate regression with fixed effects	9
Others (Heckman selection model)	1
Propensity score matching	5
RCT	31
Regression discontinuity design	1
Total	**57**

All of the studies using propensity score matching have common support and test for balance and match on observable variables. Three of the five use more than one round of data, including pre-programme baseline, while the remaining two match participants to non-participants after the roll-out of the programme. Seven studies use instrumental variables to deal with endogeneity of programme placement. See Table 5 for a list of the instruments they use.

Table 5: Instruments used in included studies that use instrumental variables

Paper title	Country	Intervention	Description of the instrument
Impacts of the Productive Safety Net Programme in Ethiopia on livestock and tree holdings of rural households	Ethiopia	The effect of the Productive Safety Net Programme on livestock and forest assets	Lagged assets holdings, number of trees planted and number of livestock
Dynamics of demand for index insurance: evidence from a long-run field experiment	India	The development of a new insurance market (dynamics of demand). This detailed study uses a seven-year panel of rainfall insurance purchase	Three period lags of a randomised marketing intervention

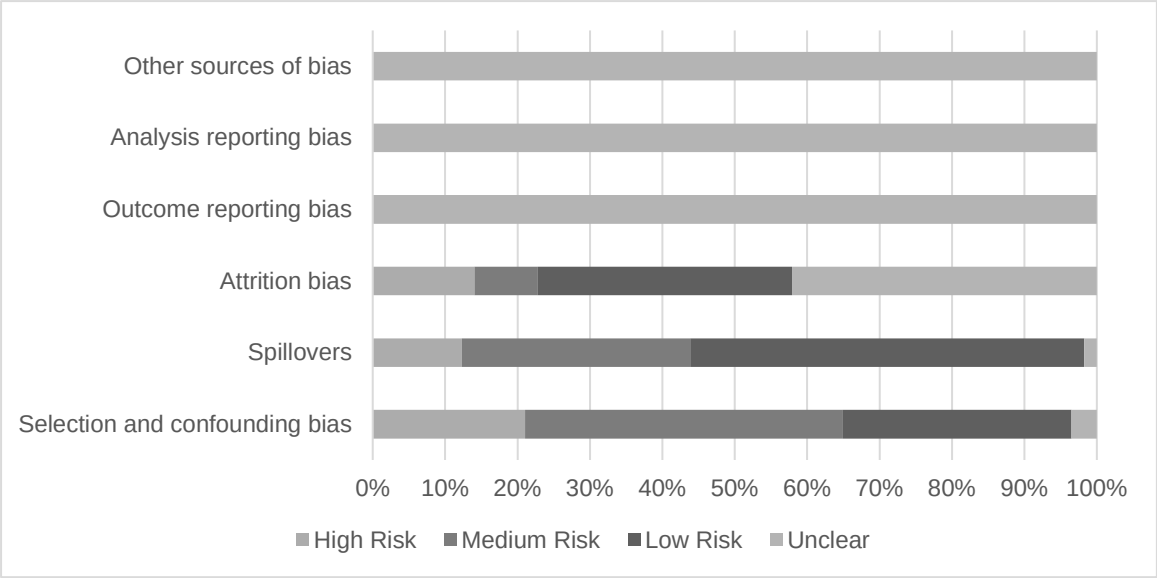
Paper title	Country	Intervention	Description of the instrument
		decisions made by rural farming households in Gujarat, India	(exogenous instruments)
Microcredit as insurance: evidence from Indian self-help groups	India	How membership of self-help groups acts as insurance during weather shocks	Group membership is instrumented by an indicator variable for landless labour interacted with caste
Measuring the impacts of Malawi's Farm Input Subsidy Programme	Malawi	Coupons for the Farm Input Subsidy Programme for fertiliser use. The study measures fertiliser use and maize yield	Length of residency in village interacted with village size (squared)
Subsidies promote use of drought-tolerant maize varieties despite variable yield performance under smallholder environments in Malawi	Malawi	The Farm Input Subsidy Programme's effect on the adoption of drought-tolerant maize variety (the programme distributes free seeds to smallholder farmers)	Access to the programme was a dummy variable for households having non-agricultural business income
Risk and farmers' investment in productive assets in Nigeria	Nigeria	Transfers for investment to individual project participants to purchase risk-reducing assets such as irrigation pumps	Eligibility by state of residence Eligibility by gender Eligibility by years of education
Household savings and productive capital formation in rural Viet Nam: insurance versus social network	Viet Nam	The role of the social network and insurance in determining household savings and productive capital formation in rural Vietnam	Ethnicity, area, distance and language

Fourteen of the included studies use secondary data. All the others use primary survey data combined with qualitative data. Importantly, three quarters of these 43 studies use panel data (averaging around three years), and fewer than one-fifth use cross-sectional data. Studies that use RCTs mostly use primary data. RCTs that also use panel data comprise more than half of our studies (26 use panel data from primary or secondary sources).

Assessing risk of bias in impact evaluation studies Understanding a study's risk of bias is a major factor in understanding its quality, so we developed a checklist (Waddington et al. 2014) of key criteria to assess the risk of bias for each study. We carefully examined each study for selection and confounding bias, spillover, attrition, outcome reporting bias, and analysis reporting bias. We then constructed an overall risk of bias score for all of the studies, where we gave each type of risk equal weight. Next, we scored every study as high, low and medium risk. See online Appendix E for the rules to calculate risk of bias from this checklist. Figure 5 summarises our findings across the 57 included impact evaluation studies.[5]

[5] Of the 57 included impact evaluation studies, 34 were published in peer-reviewed journals. Both systematic reviews were also published in peer-reviewed journals. It is difficult for us to gauge study quality, mainly because we can only go by what is reported, and our assessment of study quality is likely to be influenced by what is written in a report and how it is written.

Figure 5: Summary of risk of bias of included impact evaluation studies



One fifth of the studies showed high risk in ignoring and not mitigating selection biases. Most of these use quasi-experimental identification methods. Of the 12 high-risk studies, 7 use quasi-experimental methods and 5 use RCTs. Most studies did a good job of controlling for spillovers. Moving on to attrition, in the 43 studies that use panel data, 14 do not report attrition numbers at all. Of the 29 remaining, 12 mention attrition but claim that attrition in follow-up was low. Of the remaining studies, five report that attrition (or loss to follow-up) was more than 15 per cent and include tests for non-random attrition.

We are unable to report biases with respect to outcome reporting and analysis for all the studies, because we were unable to find protocols and pre-analysis plans for them. None of these studies refer to any pre-analysis plans.

The overall risk of bias suggests that the RCTs are of relatively better quality than the non-experimental studies. According to our assessment, 9 of the 32 RCTs (28%) were high overall risk and 13 of the remaining 25 non-experimental studies (52%) were high risk.

5.1.3 Findings on take-up from impact evaluation studies

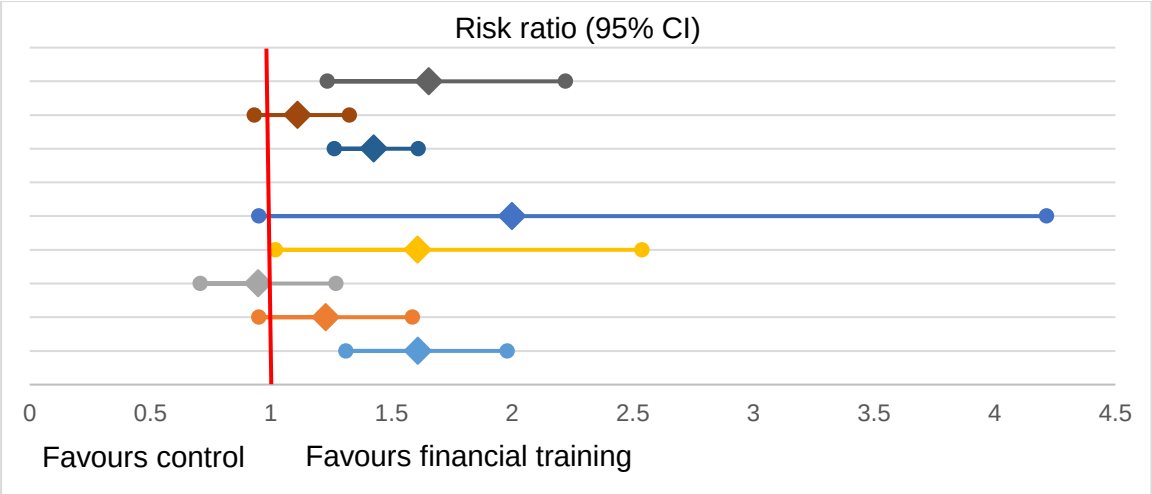
As we discussed earlier, a sizeable proportion of studies look at take-up as a first-order outcome. If we include all studies that report any take-up figures, the number increases to 39. Uptake varied by FARM instrument and intervention: cash transfers had around 95% take-up; voluntary insurance had between 5 and 60%; and free or mandatory insurance had 100%.

Similarly, a wide variety of interventions that are directed at increasing the uptake of FARM instruments have been studied. For example, 23 of the 57 studies focus on the impact on uptake of insurance due to specific interventions, both on demand, (such as

providing discount vouchers to farmers and marketing exercises) and supply (such as incentivising insurance agents and reducing basis risk).

The question then arises: What intervention is most effective in increasing uptake, and by how much? The answer remains elusive, primarily due to the non-comparability of most interventions. We could, however, extract data on uptake for eight interventions providing financial training or advice on risk management. Figure 6 plots the risk ratio of insurance uptake due to financial training; the evidence favours the hypothesis that financial training is effective in increasing uptake.

Figure 6: Effectiveness of financial training in increasing uptake of FARM insurance



Notes: CI = confidence interval.

5.2 Results from the online survey and stakeholder interviews

This section presents the main findings from our online survey of 69 key stakeholders working in the field. Most had at least three years' experience in this area, and nearly half were researchers. The others mainly worked for implementation agencies, international organisations or NGOs implementing these programmes or working on policy. See online Appendix F for an overview of the stakeholder interviews and online survey, and online Appendix C for the questionnaire.[6]

Almost two thirds of the respondents had experience primarily in Sub-Saharan Africa, and a quarter primarily in South Asia. All respondents had worked in agriculture, and a large majority (59%) had experience in weather index insurance products. More details on respondents' profiles are available in online Appendix G.

We also interviewed 12 experts in the field (4 researchers, 7 non-researchers working on implementation or policy, and 1 who was doing both types of work), and we used some of their remarks to underscore findings from the online survey. All interviewees had field

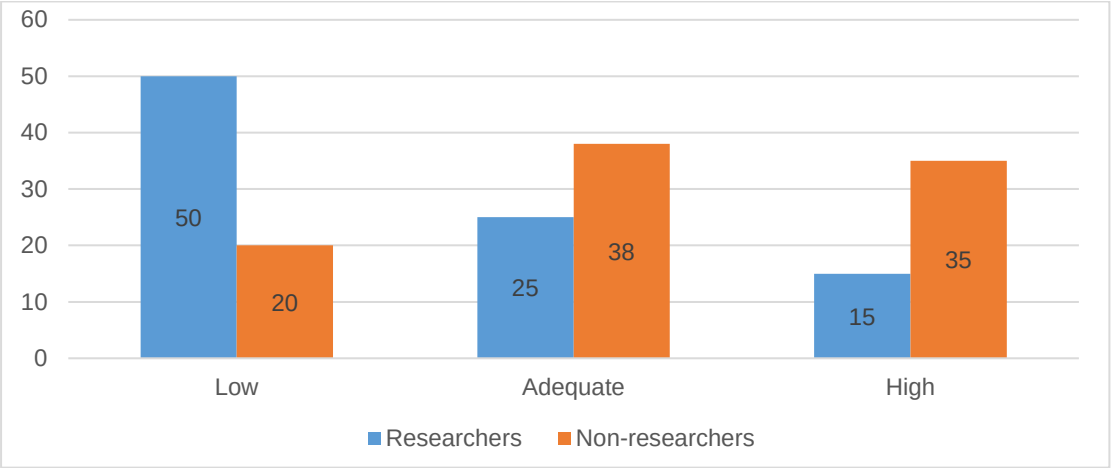
[6] To ensure the relevance of the responses, we filtered the respondents according to their knowledge in this field (Q9: *How would you qualify your knowledge…?*). Only those who considered their knowledge 'good' or 'very good' (46) had access to the entire questionnaire. Some respondents skipped a few questions, which explains the lower response rate for some questions. For clarity, we systematically report the number of respondents per question.

experience in India or Sub-Saharan Africa or both, and all had worked on insurance products. We conducted the interviews by Skype, by phone or face-to-face. They lasted an average of 40 minutes. The interview guide is available in online Appendix A, and the list of respondents is available in online Appendix F.

5.2.1 Uptake

Our survey respondents did not agree with the view that demand for FARM products[7] is very low. Only 30% judged that take-up rates were low; 35% judged them to be adequate; and 26% judged them to be high (9% did not know). If we split the sample between researchers and non-researchers (Figure 7), we see that researchers judged take-up rate as low more often than non-researchers did.[8] Those who thought take-up was low cited three main reasons: low perception of client value; lack of financial literacy; and high transaction costs.

Figure 7: Respondent perceptions of take-up rate of FARM products (n = 69)



Note: Excludes those who responded 'don't know'. Source: 3ie Stakeholder survey 2016

Although we did not specify it in the survey, 61 per cent of the products we mentioned were subsidised by (inter)national donors or government (one third at a 50% rate). This might explain why respondents judged demand to be acceptable (adequate or high). Almost half (44%) of respondents felt that agricultural insurance and, more generally, FARM programmes, cannot be implemented successfully without subsidies. Overall, respondents think that demand for these products is quite reasonable, but subsidies are necessary to achieve this level of demand.

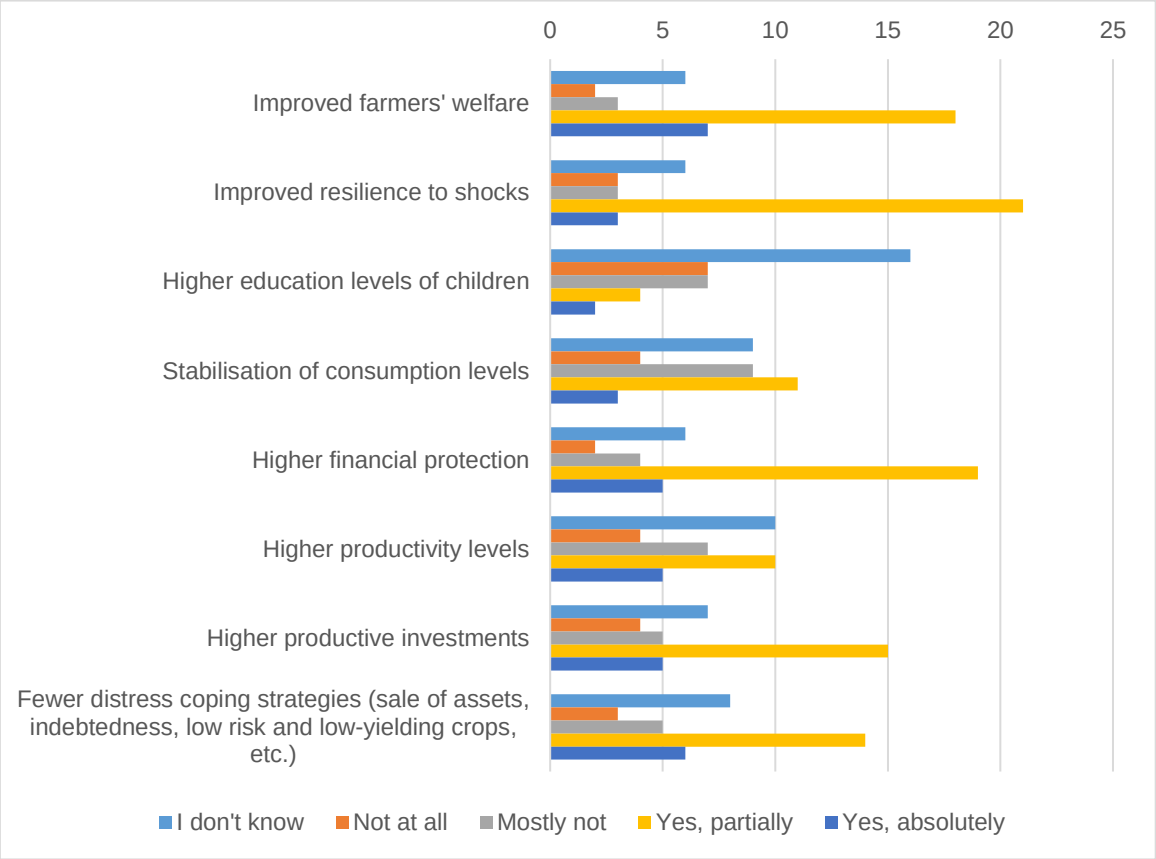
> Regarding low uptake, the issue is complex. Sometimes uptake is low because people don't quite understand these new products. At other times, it is because they understand the product well enough and determine that it isn't in their interest to buy it as it is structured. I remember USAID supported some work on index insurance in Peru. The insurance contract was well designed in that the client wasn't worse off by buying it. It sounds funny to say it that way, but in some

[7] Weather index insurance, credit guarantees, meso-level insurance, risk-contingent credits and savings, bundled products, indemnity insurance, normalised difference vegetation index or satellite index insurance, risk guarantees, loans for agricultural risk management technology, and area-yield index insurance.
[8] Equal proportions of researchers and practitioners replied 'don't know'.

> activities out there, the product as designed will not provide enough coverage to the client relative to the premium. And in many cases, the basis risk in the products means that the client is not much better off than they would be buying a lottery ticket. In the case of the product in Peru, that was not the case, but still there was a really low uptake…. So, the team went back to talk again with farmers and found that they wanted a different kind of coverage than what the insurance product was offering. It turns out that they didn't want or need to insure their potential revenue, but just to protect their investment. The team used that information to restructure the product so that it was still designed well from an actuarial perspective, but also provided the protection the farmers were looking for. — Lena Heron (USAID)

One of the survey questions focused on the outcomes of the agricultural risk management intervention (question 15 in online Appendix C). According to the 36 respondents who responded to this question, the most commonly cited outcomes achieved by FARM products were that FARM programmes led partially to improved resilience to shocks (58%), higher financial protection (53%) and improved farmers' welfare (50%).

Figure 8: Respondent perceptions of the effect of interventions (n = 36)



Source: 3ie Stakeholder survey 2016

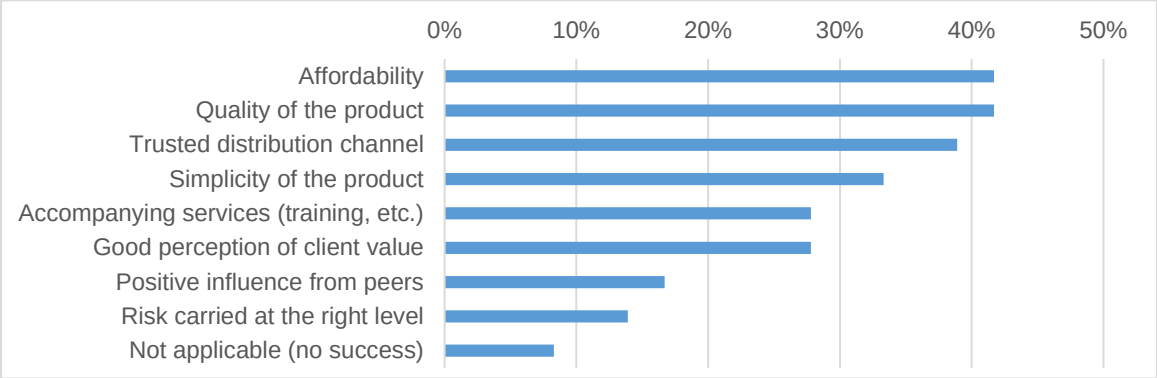
5.2.2 Reasons for success and failure

The 69 respondents also categorised the top three obstacles to reaching the desired outcomes after take-up:

1. Product quality (15 respondents; 42%)
2. Misconceived or ill-designed contracts (8; 22%)
3. Households do not use the products appropriately and have difficulties in handling them (7; 19%).

When asked about keys factors that are likely to affect the success of these FARM products, respondents mainly cited aspects that enhance demand and client value, such as trusted distribution channels, product simplicity and good perception of client value (Figure 9). Quality and affordability also seem to be important in determining good client value, which in turn can increase demand (Figure 9). Researchers and non-researchers alike ranked the same top three keys to success, but in different proportions.

Figure 9: Respondent perceptions of key success factors of FARM products (n = 69)



It is important to note a few considerations. First, the quality of the product depends on the type of product. Given that most respondents (59%) had experience in weather-based index insurance, the answers mainly concerned this type of insurance. But we cannot say anything more definitively since quality concerns are likely to differ for other product types. Second, a majority of the products mentioned were highly subsidised, so affordability concerns are likely to be underestimated. Third, respondents selected a variety of key reasons for the success of FARM programmes (multiple answers were allowed). We provide their overall ranking of the top factors contributing to the success of FARM programmes:

1. Affordability (42%)
2. Quality of the product (42%)
3. The importance of operating through a trusted distribution channel (39%)
4. Simplicity of the product (33%)
5. Accompanying services, and perception of client value (28% for each of these two options)

Similarly, when focusing on concerns raised by implementing agencies and agencies that design FARM products, respondents mentioned these three challenges most frequently:

1. Product quality (38%)
2. Regulatory issues, e.g. when spinning off activities (24%)
3. Ill-designed contracts (normalised difference vegetation index scope); payment delays; poor understanding and difficulties in handling products; and lack of rural distribution models (each 19%)

5.2.3 Quality of evidence

While 74 per cent of respondents agreed that the research questions posed in existing literature were policy relevant, most seemed to believe that the quality of impact evaluations should be improved.

When asked if there is currently convincing evidence on the impacts of financial products for agricultural risk reduction, only 9 per cent (of 35 respondents) said that most of the evidence is reliable. Most respondents (57%) declared that, even if there is convincing evidence, only a few studies are reliable. More than one third said there is no convincing evidence at all, as evidence is hampered by the fact that research ‘focuses on take-up

rates rather than on welfare impacts'. These respondents were also concerned about the findings' statistical power and external validity.[9]

Overall, researchers are the most sceptical about existing evidence on the impacts of FARM financial products. Not one of the 15 researchers who responded to the question agreed with the statement that 'most evidence is reliable'; 60% felt that 'only a few studies are reliable'; and 40% selected 'there is no convincing evidence on the impacts of financial products'. Among non-researchers, only 12.5 per cent agreed with the statement 'most evidence is reliable', but it is difficult to know whether they were familiar with available evidence.

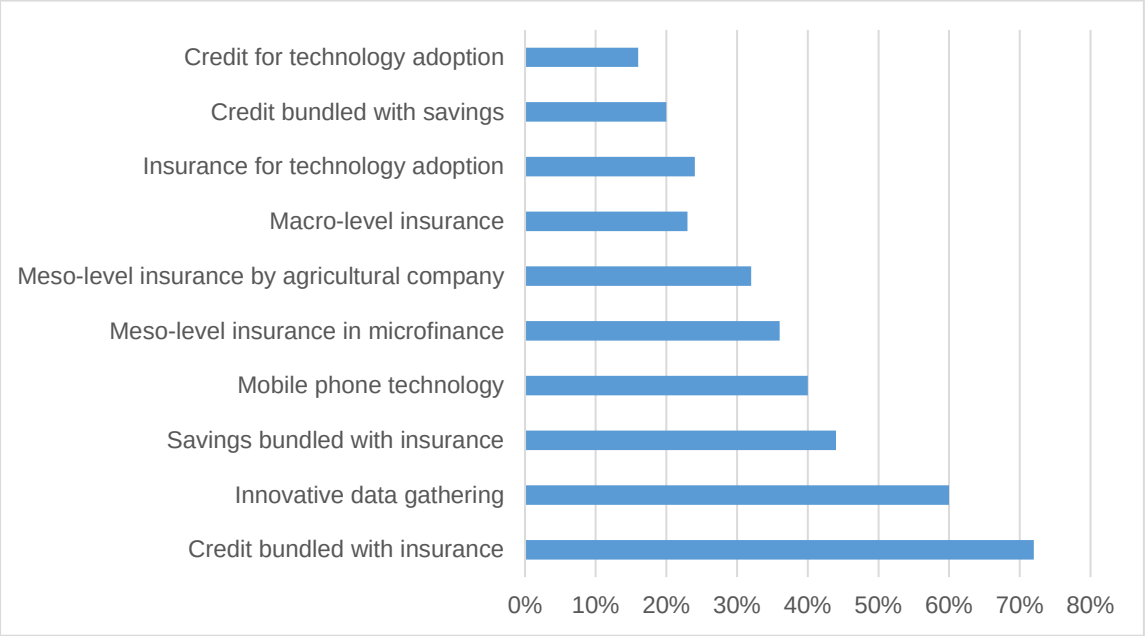
5.2.4 Innovation

Respondents felt that there is plenty of innovation – new technologies, strategies and products – being used and developed in FARM products. Among the 35 who answered the question, 75 per cent were aware of multiple innovative products or schemes. See Figure 10 for the most-cited products.

Of 34 respondents, 19 (56%) saw meso-level insurance schemes as promising for improving the welfare of the final beneficiaries and overcoming the challenges in this field. However, at the same time, they saw many practical difficulties in implementing such schemes. A majority of respondents reported two important challenges: the complexity of partnerships and the difficulty in communicating to farmers that they are indirectly insured.

There was no significant difference between researchers' and non-researchers' opinions on awareness of innovative financial products.

Figure 10: Respondent perceptions of innovation in FARM products (n = 35)



[9] It is not possible to distinguish this perception by implementers and researchers because in some cases respondents classified themselves as both.

During personal interviews, stakeholders said that innovations in FARM (new technologies, strategies and products) were understudied. They also felt that bundled products were particularly relevant,[10] given their potentially positive influence on take-up rates and transaction costs. For example, in India, insurance is compulsory and bundled with credit, implying high access to insurance products. One interviewee specifically pointed out the important role played by farmers' organisations in helping to influence the uptake of bundled products.

> The thing I am most excited about – I think this could have real impact – is the way crop-cutting experiments are conducted and audited. One, which we are implementing, is about using mobile phone technology for collecting the data, collecting the videos…. I think this could revolutionise the collection of yield data for use in agricultural insurance programmes, and ultimately the reason we are looking at yield data is because there is some evidence that it could lead to more accurate products. It could fix this product quality issue if it's possible to collect the data in a way where it can be audited, where it's transparent, where it's very difficult to manipulate the data. — Anonymous

Interviewees identified main innovations related to new technologies and what they can bring to insurance interventions:

- Mobile phones to collect data or make payments, which is quite a new and experimental tool. They did point out that managing cash transactions by mobile phone is not as developed as using them for information. One interviewee questioned the effectiveness of this type of technology for vulnerable or small-scale farmers;
- Satellite-based measures and instruments (such as normalised difference vegetation index and remote sensing) for data collection; and
- Although perceived as vague and in need of more theoretical foundations, interviewees considered meso-level insurance products to be an innovative area of research, with great potential to help the agricultural insurance market grow and become more sustainable. One interviewee said, 'There is a lot more potential for looking at how to utilise these instruments along other players within the value chain'. Another observed that meso-level insurance is developing quickly in many countries, partly because it can be used in numerous ways: as an incentive or socio-market tool for agro-businesses and to secure portfolios.

The following innovations were mentioned by one interviewee (not necessarily the same one):

- Drones to improve the quality of insurance products are promising, but they have only been discussed and not implemented to date;
- Developing yield risk management and new crops that are more resilient to climate change have recently received a fair amount of attention, and they deserved more attention, as they could be 'an easier win';
- Combining different data sources, such as national statistics, satellite data and independent surveys; and

[10] Interviewees mentioned different types of bundled products, including insurance bundled with: credit; high-quality seeds or fertilisers; irrigation (in India); or the introduction of new technologies.

- Agricultural mobile advice (extension services) is an 'interesting and promising way of coping with risks'. The interviewee has implemented this in India, and similar services exist in Ethiopia.

5.2.5 Research gaps

In this section, we compare online survey answers on research gaps with the priorities we collected during key stakeholder interviews. Comparing the answers from both groups, we find the conclusions on research gaps we drew from the survey respondents are coherent with the priorities we collected during the interviews with key stakeholders.

Online survey responses: This section explores the most experienced respondents' (minimum of five years' experience) answers on the most policy-relevant research areas,[11] and those from the entire sample on the most promising research questions (Table 6.[12] It is divided by response.

1. **Impact on farmers:** Respondents pointed to the need for more rigorous evidence on the impact of different products on final beneficiaries. Referring to various outcomes from behavioural changes to welfare impact, they proposed a range of questions for further research:
   - Are there differences in impact between voluntary individual weather insurance and automatic coverage via disaster relief programmes?
   - Does subscription to the product have an impact on ex-ante risk decisions?
   - What are the welfare and productivity impacts of these programmes?
   - How do these programmes affect investment decisions?

2. **Product quality:** Respondents also wanted more evidence on product quality. They expressed concerns about improving product design (especially the use of new technology to reduce the cost and basis risks of offered products). Affordability and good product quality were both the most-mentioned challenge and the most-mentioned key to success (at 40% each). Several experienced respondents highlighted the need for rigorous evidence on basis risk and client value. This is in line with the challenges respondents said they faced when implementing products. Here are some of the questions for further research:
   - Can the instrument reduce risk exposure?
   - Can it adequately cover risk?
   - How can basis risk be reduced?
   - What is the perceived value for farmers?

3. **Demand:** Respondents noted a research gap around demand for specific products, particularly bundled products and informal FARM instruments. Here are some of the suggested research questions:
   - What affects demand in the informal sector?
   - What is the demand for bundled products?
   - Can value chain bundled agricultural insurance products improve take-up rates?

[11] Question 30: Which research questions would be interesting to explore from a policy point of view?
[12] Question 35: Could you please list, in priority order, the three main areas for which more rigorous evidence is needed / the most promising areas to investigate in this field?

- What (is the) effectiveness of bundling different risk classes or FARM products with value-added services?

4. **Supply*:*** Respondents suggested the following research questions related to supply:
   - Can voluntary agricultural insurance sustain itself?
   - What public investments are most effective in promoting commercially viable index insurance products?

Top three promising research priorities Table 6 shows survey respondents' answers when asked to list, in priority order, the three main areas for which they believed more rigorous evidence is needed or that they considered the most promising areas to investigate in the agriculture insurance field.

Table 6: Survey respondents' top three promising research priorities (n = 27)

Priorities	**Researcher responses**	**Non-researcher responses**	**Total**
Rigorous studies of behaviour changes and welfare outcomes	10	17	**27**
Improved technology or design (e.g. remote sensing, satellite data, improved seeds or inputs) to drive costs down and basis risk	8	6	**14**
Bundled products: a. *Investigate the possibilities of bundling products;* b. *Study the demand for bundled products; and* c. *Analyse the effectiveness of different products for different purposes, different risks, or covering multiple risks.*	3	5	**8**
Impacts of voluntary versus obligatory insurance	2	1	**3**
Meso-level insurance	2	1	**3**
Long-term studies	1	1	**2**
Using insurance as part of a safety net	0	2	**2**
Gender differences	2	0	**2**
Understanding of product, financial literacy or education	1	1	**2**
Distribution channels	0	2	**2**

Key stakeholder interviews This section explores responses from our key stakeholder interviews, which produced similar results to our online questionnaire. One interviewee stated that 'There is still a lot of room for evidence', as the actors in this field are still 'in a learning phase'. Another pointed to a lack of evidence on whether selling insurance to farmers is making a real difference.

1. **Product design and quality:** Interviewees also pointed to a lack of evidence on product design, particularly around complexity and quality. This echoes supply concerns related to products (a clear call for regulation and customer protection). One interviewee said, 'The development finance community needs more objective standards to evaluate the quality of the products sold. The people who market these things could benefit a lot from this kind of research [on the quality of the product]'.

   Interviewees seemed to agree with survey respondents on the need for further research into product quality. Although it is by no means certain that good products would lead to higher take-up rates, there is evidence that ill-designed products lead to drop-out and non-renewals. Interviewees mentioned the lack of evidence on the effects of the risk management products, in particular for a household's production and consumption behaviour, and the ensuing outcomes for farmers' incomes, productivity, risk aversion, access to other financial products and investments.

2. **Quality of data:** Related to product quality issues, interviewees also raised the issue of the quality of the data used in existing research as a key challenge, both in terms of time span (the longer, the better) and transparency (the more objective, the better). As one interviewee pointed out, 'We do not have enough data on the risk situation over time…. We need much bigger datasets'. Therefore, good-quality data could help researchers and insurers design better products for the farmers.

3. **Welfare impacts:** Overall, interviewees seem to point to a lack of evidence on the welfare impacts of FARM products. At the same time, by highlighting the importance of basis risk, the quality of the insurance and the demand for insurance, they also show some concerns around the viability and effectiveness of these products. This suggests that more effort needs to be put into designing high-quality insurance products to ensure sufficient demand and allow for assessment of their welfare impact.

4. **Role of policymakers:** Interviewees pointed to the lack of research on the role of policymakers in the field of agricultural insurance,[13] noting a divergence between the types of research projects that are undertaken and the kind of evidence that interests policymakers. The latter are primarily interested in evaluating large-scale programmes and scalable products, while researchers often focus on small projects over short time periods that are not necessarily sustainable in the long run. As a result, research is often not relevant. Additionally, interviewees pointed out that farmers also often use insurance as an instrument for social protection.

   Another point that emerges from the interviews is the challenge in overcoming differences between what researchers and policymakers want, and between what the two groups think makes sense. One interviewee working in policy implementation expressed regret that academics are more interested in

[13] Note that this issue was mostly raised by non-researchers rather than by researchers (five against one).

publishing papers than in working more closely with policymakers. Another said, 'Research is addressing trivial questions really well, but policymakers are addressing really good questions really badly'. One interviewee pointed out that policymakers and researchers share a common interest, saying, 'Policymakers need the evidence provided by researchers when they advocate for such tool or a particular way of implementing it'.

5. **Gender:** One interviewee mentioned the lack of gender focus. Acknowledging that some work has been done on this, she said, 'There is still a lot of work that could be done to make insurance more gender sensitive'.

6. **Global approaches:** Interviewees also agreed about the lack of research on global approaches that would combine, for instance, insurance, credit, saving and extension services. One interviewee suggested that research should be 'broader' and include studies combining financial and non-financial products.

Top three promising research priorities Interviewees were asked to prioritise the areas they consider the most promising to investigate in the future. The two priorities most commonly cited by four key stakeholders were the need for more rigorous research on the role of public policy and on product design.
The next most promising research areas cited by three key stakeholders are listed below:

- Evaluation of large/integrated programmes (only cited by non-researchers);
- Evaluations with a large time window;
- Extension services; and
- Technological innovations (only cited by researchers).

Finally, two interviewees mentioned each of the following:

- Productivity impact;
- Structuring value chains;
- Access to finance and improved inputs;
- Bundled products; and
- Welfare impacts.

6. Conclusions and implications for future research

In this section, we discuss our findings on the evidence gaps and impact evaluation challenges, which we used to inform 3ie's Agricultural Risk Insurance Thematic Window. These are based on the findings of each of the approaches we used in this study: the EGM, the online survey and the stakeholder consultations.

Finding 1	Several challenges, including low take-up, hinder the adoption of FARM technologies, making impact evaluations problematic.

Take-up of most FARM products – and agricultural insurance in particular – is low. This is despite most of them being provided at subsidised rates. Our stakeholder interviews suggest some reasons for low uptake could include that FARM products are: (a) not sufficiently customised to local risk exposure; (b) sometimes inadequate (in the face of multiple risks or other perils, such as plant diseases, pest attacks or wild animal grazing);

(c) too complex; and (d) of poor quality (basis risk levels are still high). Farmers may attach a low value to the products or have good reasons not to subscribe that are often ignored by FARM product designers.

We compiled a number of interventions to improve take-up, including financial training and insurance advisory services, which we found had consistent positive impact on take-up. Yet we would advise caution when interpreting these results, as the nature of FARM services varied considerably across studies. Low take-up and renewal rates make evaluations difficult.

The main first-order question that needs to be answered is: What can be done to increase take-up and renewals? Low take-up makes impact evaluations inadequately powered and too biased for us to be able to draw credible conclusions.

Finding 2	Various contextual issues – including product quality – also affect the success of FARM products in reaching their desired outcomes.

Most stakeholders are of the opinion that FARM products are only partially successful in improving outcomes, such as income and resilience, attributing this lack of success to the poor quality of the product itself. This reason was further highlighted in our consultative workshops in Delhi and Nairobi.

Product quality is one of the key assumptions in our theory of change. It appears again as first-order output, as we expect constant improvisation and flexibility in product design. Yet, as our EGM shows, very few studies have examined product quality, which is important to note, as it is an important linkage in our theory of change, which would allow longer-term outcomes to manifest.

Other contextual factors that play an important role in the success of FARM products are the presence of informal risk-mitigating strategies, lack of trust, and the regulatory environment. We discussed these factors extensively in our theory of change workshop and our consultative workshop. In particular, participating stakeholders have called for the government to take on a role subsidising FARM and insurance products or as re-insurers.

Finding 3	There is a lack of focus on long-term (5–8 years) outcomes, in particular welfare impacts and the effect of innovations, among others on bundled products.

Most existing evidence is based on study outcome variables that can be measured on a short time horizon. Examples include productive investments, farm investments, changes in cropping patterns and access to finance and consumption. While these are no doubt important, investigating welfare impacts of FARM products (e.g. health and education) concurrently would also be valuable. Doing this would require costly, longer impact evaluations. This is especially true for insurance contracts that have a low probability of paying out and in cases where welfare impacts are mainly expected through changes in behaviour.

There are other outcomes on the demand side that would also require long-term evaluations. Few papers study renewal rates. Given the general low renewal rates and

the threat this represents for product sustainability, it is an area where more research would be useful. In the case of voluntary subscriptions, renewal rates can be seen as a form of client product appraisal. A second outcome that needs more study for in-depth understanding is behaviour under risk, or more specifically, risk perceptions and the way in which perceived ex-post impacts drive ex-ante changes in behaviour.

Long term-evaluations of supply-side outcomes are also lacking. Almost none of the included studies investigated the cost-efficiency of FARM products or technological innovations, such as the use of digital education. Similarly, very few empirical and theoretical studies focused on the impacts of offering bundled products (either bundling several risk classes or bundling products with value-added services). Note that a majority of survey respondents reported two important challenges for the implementation of such products; namely, the complexity of partnerships and the difficulty in communicating to farmers that they are indirectly insured. In terms of evaluation, since such products are often compulsorily bundled (especially in India), the uptake levels are less problematic.

Finding 4	Our included evidence concentrates on studies in a few countries of Sub-Saharan Africa and South Asia. Index insurance products, grants and direct subsidies have recently received much attention.

Almost 73 per cent of the interventions studied in the 59 included papers are based in seven countries in Sub-Saharan Africa and South Asia. Apart from India, the focus is not always on countries where there have been large FARM programmes, such as Turkey or Mexico.

The increasing number of studies indicates the promise of index insurance products to overcome supply-side difficulties, such as moral hazard, adverse selection, and high transaction and verification costs that are otherwise included in indemnity insurance products.

Other studies show that one way to improve uptake is to encourage demand through subsidies. However, this has implications for the econometrics of evaluation, as there is a discrepancy between the estimated impacts with subsidies and any impacts that would be obtained if the intervention were to be scaled up without subsidies. There is no general agreement among respondents on whether FARM products, when voluntary, can or cannot be sustainable without subsidies.

Finally, multiple factors influence the price of a product, including transaction costs. Innovations, such as mobile money and bundled products, might be able to reduce these costs and therefore the overall product cost. In light of the marketability of these products, price is not the only issue: design, quality and complexity are also key factors that need to be taken into account.

Finding 5	Very few studies explore the potential interactions between FARM tools and public policy instruments or focus on gendered differential impacts. Despite an increased interest in FARM tools among researchers and practitioners, there remains wide scope for future research.

Little evidence exists on the interactions between FARM tools and public policy instruments, such as using insurance as part of a social safety net scheme. The role

played by public policies is central to reach impact, either through the signals given to farmers when big disasters occur (free compensation systems), through the prevailing regulatory environment, or by relying on public subsidies, as previously mentioned.

Our included studies also lack a specific focus on gender. It is very likely that women and men have a different exposure to risk and think differently about risk, but less than 9 per cent (8) of the studies included in the EGM look at differential effects on women and men.

This scoping paper highlights the increasing interest in FARM instruments among researchers, decision makers and practitioners. Not only has the number of studies increased recently, but the quality of available evidence has, too.

Nevertheless, a wide scope for research remains open. Below are the main implications for future research:

1. Addressing low take-up of FARM products includess looking at product features (particularly improving product quality and adequacy); tailoring product design to the local risks; using innovations; and exploring new types of bundled products;
2. Investigating the role of public policy, including thinking through whether FARM products, and in particular crop insurance programmes, provide better value for money for governments than post-disaster compensation schemes;
3. Adopting a long-term perspective in research would add value to current knowledge and allow analysis of the long-term welfare impacts of FARM technologies (e.g. education or health);
4. Increasing the amount of rigorous evidence on the impact of FARM interventions on behaviour under risk includes reactions to risk and risk perceptions and ex-ante behaviour changes (including production decisions, although the EGM did not identify these as an evidence gap). Similarly, stakeholders prioritised getting additional evidence on productivity outcomes following FARM interventions;
5. Increasing attention given to differences between women's and men's agricultural risk exposure and risk perceptions to understand differentiated effects of FARM financial interventions on women and men; and
6. Developing and increasing reliance on theoretical models to better understand the mechanisms at play, in particular for innovative (e.g. bundled) products.

However, a number of important challenges – such as low uptake and related power issues – are important and will need to be solved in order to conduct high-quality impact evaluations. Some countries solve this problem through mandatory subscription; for example, by compulsorily bundling loans with insurance. Other challenges to overcome include regulatory constraints, reliance on heavy subsidies and the expectation of free government compensation.

Online appendixes

Note to the reader: Online appendices are provided as received from the authors. They have not been copy-edited or formatted by 3ie.

Appendix A: Semi-structured interview guide

http://www.3ieimpact.org/media/filer_public/2017/08/23/sp9-appendix-a-semi_structured_interview_guide.pdf

Appendix B: Workshop agenda and list of participants

http://www.3ieimpact.org/media/filer_public/2017/08/23/sp9-appendix-b-workshop_agenda.pdf

Appendix C: Online survey Instrument

http://www.3ieimpact.org/media/filer_public/2017/08/23/sp9-appendix-c-survey_instrument.pdf

Appendix D: Important insurance related definitions

http://www.3ieimpact.org/media/filer_public/2017/08/23/sp9-appendix-d-insurance_related_definitions.pdf

Appendix E: Rules to assess risks of bias in individual included studies

http://www.3ieimpact.org/media/filer_public/2017/08/23/sp9-appendix-e_rules_to_assess_risks_of_bias.pdf

Appendix F: Overview of stakeholder interviews and online survey

http://www.3ieimpact.org/media/filer_public/2017/08/23/sp9-appendix-f-overview_of_stakeholder_interviews_and_online_survey.pdf

Appendix G: Profile of survey respondents

http://www.3ieimpact.org/media/filer_public/2017/08/23/sp9-appendix-g-profile_of_survey_respondents.pdf

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3ie undertook this scoping study to inform the focus for the Agricultural Insurance Thematic Window grant-making. The study looked at the state of existing high-quality evidence on agricultural insurance for poor smallholder farmers in low-and middle-income countries, in particular, the take-up of insurance and insurance-related products.

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