Integrating gender into index-based agricultural insurance: a focus on South Africa

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ABSTRACT
Index insurance is an agricultural risk management tool that can provide a safety net for smallholder farmers experiencing climate risk. While uptake and scale-out of index insurance may be slow among smallholders, we can learn from experiences that demonstrate where crop insurance can protect smallholders’ livelihoods from climate risk. Integrating gender into climate risk management is necessary to ensure that the benefits of index insurance are experienced by both men and women. A dedicated intention to integrate gender may be required. Taking South Africa as a case study, the potential for gender-sensitive index insurance scale-out among smallholders is investigated.

Agriculture insurance for climate change resilience

Catastrophic weather events can negatively impact on poor farming households with long-term and irreversible consequences when their crops or livestock are damaged or destroyed (Collier, Skees, and Barnett 2009). The barriers for smallholder farmers to increase their productivity are well known (e.g. lack of inputs, knowledge, information) and include lack of credit (Fakudze and Machethe 2015). Without credit, farmers are severely constrained from investing in agricultural inputs or technologies that may provide resilience to climate change. In a survey of 1,800 farm households in Ethiopia and South Africa, smallholder farmers cited a lack of credit and wealth as their main barriers to adaptation to climate change (Bryan et al. 2009). Access to credit via formal financial lending institutions can be limited for smallholder farmers, in particular women, who generally own less land and other fixed capital (Asfaw et al. 2015). In addition, smallholder farmers often sell their productive assets to protect their immediate consumption even if this undermines their longer term capacity to generate income and can generate poverty traps (Hellmuth et al. 2009).

Agricultural insurance provides a means of protection from financial loss (Singh 2010). Insurance can allow farmers to take risks that they ordinarily would not take, because it can provide a safety net that, for example, can allow farmers to invest in agricultural inputs. Insuring against risk can help to incentivise the availability of, and demand for, credit (Carter et al. 2014). Index-based weather insurance is a particular type of insurance that uses models of how climate extremes affect crop production to define certain climate triggers that if surpassed have extremely high probabilities of causing substantial crop loss. When harvest losses occur associated with exceeding the climate trigger threshold, the index-insured farmer would be entitled to a compensation payment. If the farmer’s crops fail due to an insurance covered climate risk, they can have some assurance that they will not fall as quickly into poverty.

Index insurance is considered a climate smart agriculture (CSA) practice because it potentially offers the opportunity for smallholder farmers to increase their resilience and minimise their risk in relation to livelihood changes arising from weather shocks (FAO 2013). Unfortunately, index
insurance schemes still fail to attract the clients (e.g. smallholder farmers) considered to be most in need of this climate risk management tool (Gine, Karlan, and Ngatia 2011; Delavallade et al. 2015; Akter et al. 2016). This article considers some gender issues that can affect the functioning of index insurance systems.

**What is index-based insurance?**

Conventional indemnity-based insurance, also known as multi-peril crop insurance, typically covers multiple risks or perils that affect farmers’ crop yields and is based on individual yield shortfalls which are verified by an assessor (Hansen, Rose, and Hellin 2017). Due to high transaction costs associated with assessment and low purchasing power of smallholders, multi-peril insurance is expensive and considered unfeasible for smallholders farmers in low-income countries (Hansen, Rose, and Hellin 2017). Index insurance links insurance payouts to an index, such as rainfall, temperature, humidity or crop yields, rather than actual yield shortfalls. There are two main types of indices used in index insurance: (1) weather-based; and (2) area yield indices.

In weather-based indices, the chosen meteorological index is typically the indicator of yield that is affected by weather, that can indicate when there are particularly bad yields (Binswanger-Mkhize 2012; Leblois and Quirion 2013; Carter et al. 2014). Weather-based indices must be highly correlated to agricultural production, easily quantifiable, publicly verifiable, and not subject to manipulation by the insuree (Carter et al. 2014). In addition to numerous projects implementing index insurance as a viable commercial product, there are several studies using hypothetical weather index insurance products to gauge interest and more realistically determine the probability of success of a project or product in African countries (Skees 2001; Hill, Hoddinott, and Kumar 2013; Yuzva et al. 2018).

Area yield indices are based on historical average yield losses over a specific region and are usually for a specific crop (Wang et al. 2013; Tadesse, Shiferaw, and Erenstein 2015). Area-yield indices require reliable and long-term data, which are not always available (Wang et al. 2013). Index insurance based on meteorological indices is a more common form of index insurance to date, because data rely on weather records, which tend to be more available (Wang et al. 2013).

Weather-based and area yield indices can also be combined into one index. In a study of index insurance in South African maize cultivation, Wang et al. (2013) found that multivariate weather indices (which involves observation and analysis of more than one variable at a time) are superior to single variables indices when considering correlation of the index to yield. Historical yield records in South Africa are only available at the provincial level and not yet at the finer-scale district level (Wang et al. 2013).

Although a promising CSA tool, index-based agricultural insurance faces some challenges for scale-out across multiple farms, farmers and agricultural landscapes. Weather indices do not provide a direct measurement of farmer’s yields. The extent of correlation between the meteorological data used for an index and the crop yield attained can be quite weak, which leads to a problem called basis risk (Leblois and Quirion 2013; Yuzva et al. 2018). At the location of meteorological monitoring (i.e. a rain gauge or weather station), rainfall levels may exceed the threshold (or trigger) level for defining a drought, while at an insured farm at a different location there could be a drought with farmers experiencing different losses (Carter et al. 2014; Bageant and Barrett 2016). However, all farmers would receive the same payout from an index insurance scheme because they are all covered by the same index formula and data, irrespective of their specific location (Collier, Skees, and Barnett 2009; Carter et al. 2014; Greatrex et al. 2015). The risk that the index may not correlate well with yield losses increases where there is high spatial variability of weather patterns. This risk can be minimised by having many weather stations (Leblois and Quirion 2013), which is not always an option in poorer regions where there is little public or private investment for provision and maintenance of such weather stations.

Conventional agricultural insurance systems have high transaction costs because a qualified assessor must travel to each farm to assess damages when a claim is made. Index insurance has the
advantage of not requiring on-site inspection as it protects against shared (weather-related) rather than individual risks. In index insurance systems, assessing damage in each field is not required. Instead data from satellites, weather stations and historical yields are used. Due to its lower costs of implementation and operation (Carter et al. 2014) index insurance may be more suited to smallholders than traditional loss-based insurance systems (Yuzva et al. 2018).

Another advantage of index insurance is that moral hazard and adverse selection are reduced. Moral hazard is a term used to describe the risk of farmers falsifying losses (Peterson 2012). With multi-peril insurance, some farmers may be tempted to let their crops fail because a payout is guaranteed (e.g. as an alternative to efforts to rescue a bad harvest). Adverse selection occurs when the insuree possesses hidden information about their risk exposure which the insurer does not possess, resulting in an inaccurate assessment of risk by the insurer (Carter et al. 2014). Adverse selection results in farmers with greater risks preferentially purchasing insurance which increases premiums and payouts (Hansen, Rose, and Hellin 2017).

**Index insurance as an emerging CSA tool**

It could be assumed that smallholder farmers are not overly interested in index insurance due to the low rate of uptake (Zevenbergen 2014; Yuzva et al. 2018). Private sector agricultural insurance companies will have the most information on insurance demand, markets and potential clients, but due to the nature of private sector competition, information on insurance uptake is not always publicly available. Evidence is emerging of scale-out of index-based insurance for smallholders from different parts of the world, with the growth in uptake of index insurance from year to year looking promising (Hansen, Rose, and Hellin 2017). Examples include the Indian National Index Insurance Programme (reaching 30 million farmers); the East African Agriculture and Climate Risk Enterprise (ACRE) (200,000 farmers); the R4 Rural Resilience Initiative in Ethiopia, Senegal, Malawi and Zambia (over 40,000 smallholders); the Mongolia Index-Based Livestock Insurance Project (IBLIP) (15,000 nomadic herders); and the Kenya/Ethiopia Index-Based Livestock Insurance (IBLI) project (reaching poor nomadic pastoralists).

Greatrex et al. (2015) cite some reasons for the success of some index insurance schemes, including; explicitly targeting obstacles to improving farmers income; integration of insurance with other development interventions; giving farmers a voice in the design of products; investing in local capacity; and investing in science-based index development. Akter et al. (2016) highlight the potential for index insurance to bring social safety net benefits to women farmers who may have low adaptive capacities. Insured farmers involved in the ACRE project earned 16% more income and invested 19% more compared to uninsured farmers in the same area (Greatrex et al. 2015). However, there was minimal information on the types of farmers who purchase ACRE products, and a lack of significant collection of gender aggregated data (Greatrex et al. 2015).

In India a range of index insurance schemes are in operation, with insurance reported to have reached approximately 24% of farm households (Greatrex et al. 2015). However, this is not due to the private insurance sector alone. In India, scaling out index insurance can be attributed to a state subsidy of 75% of insurance premiums. Furthermore, insurance is also a criteria to access agricultural credit from the state (Singh 2010; Binswanger-Mkhize 2012).

India apart, considering the number of smallholder farmers who are likely to be impacted by climate-related risk, the numbers of smallholders involved in insurance schemes remains low (Binswanger-Mkhize 2012; Greatrex et al. 2015). The uptake of index insurance in developing countries has been considered to be slow, with several studies reporting an uptake rate below 30% among targeted farmers in Malawi (Giné and Yang 2009) and India (Cole et al. 2013). While 30% is a relatively high percentage, this figure occurred in studies where farmers were specifically targeted, which seems to bode ill for future index insurance endeavours where a more passive delivery channel may be taken. Indeed, Akter et al. (2016) describe the market for index insurance as a stand-alone product as poor both in terms of demand and governance.
Several lessons have been learnt as index insurance schemes have increased in number and studies are emerging with results. Scarcity of both long-term meteorological data and farmer yield data prove to be challenges for creating insurance products. Nieto et al. (2012) investigated drought index insurance for beans in Nicaragua and recommended combining modelled weather data (such as “MarkSim” and “WorldClim”) with a reliable crop model to produce predictions of risk that could be used in index insurance. Akter et al. (2016) investigated index insurance for crops in Bangladesh and recommended that index insurance schemes should focus on improving the credibility of institutions offering insurance as trust is an essential component of providing financial services.

**Gender and scale-out of index insurance with smallholder farmers**

Index insurance programmes can experience difficulty in reaching their target clients who need insurance protection, which can often mean female smallholder farmers (Gine, Karlan, and Ngatia 2011; Delavallade et al. 2015). There is some evidence that participation of female farmers in weather index insurance pilot programmes in Africa has been lower than male farmers (Delavallade et al. 2015). For example, in a randomised field experiment in Burkina Faso and Senegal, female participants had a significantly lower demand for insurance than male participants, spending 570 CFA francs less on insurance than men (Delavallade et al. 2015). This was a sizable difference, being close to 30% of the average amount spent on insurance in the study. One possibility is that women may not farm the “main” crop of the household and would prefer insurance for a different crop altogether. On the other hand, Bageant and Barrett (2016) found that index-based livestock insurance was equitably accessed by female and male pastoralists in Ethiopia, and that evidence for gender-differentiated demand was limited. Understanding the factors, both financial and non-financial, that determine demand for insurance may help to improve smallholder’s access such risk-mitigation products and to promote this CSA practice.

A slow uptake of index insurance may also be due to insurance providers not adequately considering gender issues (such as specific constraints that rural women face) or due to different communication channels being required to reach female farmers. Experts at a workshop in Senegal entitled “Scaling Up Climate Services for Farmers in Africa and South Asia” highlighted the necessity for emphasising gender and social differentiation at the outset of climate service projects (Tall, Jay, and Hansen 2013). Key gender questions for index-based insurance include: What are the different experiences and roles for men and women in agriculture which might have an effect on how they benefit from or get involved in index-based insurance? What are the implications of such differences for the scale-out of index-based insurance? Given these implications, what do the institutions involved need to do when pursuing the piloting or scale-out of index-based insurance to ensure equality of uptake among men and women?

A common reason cited for limited uptake of index insurance by smallholder farmers is that they cannot afford such a product (Hellmuth et al. 2009; Binswanger-Mkhize 2012). However, some practitioners argue that when index insurance is offered as part of a portfolio of risk management strategies, it will be tested by farmers (Hellmuth et al. 2009). For instance, ACRE in East Africa offers index insurance which is linked to agricultural credit provided by microfinance institutions (Greatrex et al. 2015). According to Carter et al. (2017), removing risk through index insurance has the potential to boost smallholder income and investment by between 20% and 30%. In other contexts, subsidies may have to be used for the initial seasons until the product is viable. Another challenge related to affordability is the timing of when index insurance is offered to farmers. In a study with farmers in Ethiopia, paying the premium was not a problem when cash was available directly after the harvest (Hellmuth et al. 2009; Patt et al. 2009).

A lack of trust in insurance companies has been identified as a possible barrier to scaling out index insurance products (Carter et al. 2014), coupled with a lack of understanding of the core concepts regarding index insurance (Binswanger-Mkhize 2012; Carter et al. 2014; Bageant and Barrett 2016).
Some form of financial literacy is required to assess the risks and understand the application procedures and the payout criteria. For example, both men and women need to more clearly understand that the insurance’s purpose is to protect against the risk or possible chance that they will lose their crops due to the climate. Financial literacy training could focus on unpacking associated terms with the aim of increasing confidence and knowledge when buying insurance. Women and men need to understand terms such as “premium”, “broker”, “term cover”, “interest” (often seen as a “fee”), and “insurance policy”. They also need to trust who is providing them with advice, in terms of the information provided on insurance products and their ultimate rights. Men and women also require clarity on what the insurance policy actually covers, the price each week or each instalment, and how to make a claim or cancel. Financial literacy materials that have been specifically developed may help. According to Wentzel (2016) institutions in South Africa, (mainly banks and insurance firms) are making the greatest efforts with regard to financial literacy for the general population, while professional bodies also participate in financial education (including the South African Insurance Institute). Wentzel, however, questions the effectiveness of financial education programmes, referring to erroneous errors about how the poor manage their money, in particular how those in poverty manage small and unreliable flows of money.

Another factor for consideration is that index insurance products may be gendered in their crop choice. There are instances where women grow certain crops and men grow other crops. For example, in an index insurance workshop in Ghana, farmers identified groundnuts as more often grown by women (Greatrex et al. 2016). Index insurance products tend to focus on one or two primary crops grown in an area depending on their importance for food security, their prevalence and the potential for farmers to invest in products. Thus the chosen crops for index insurance may be grown only by men or only by women. It is important to consider these factors in designing and scaling out index insurance products.

South Africa provides an example where index insurance schemes have yet to reach smallholder farmers at scale. This article focuses on the South African agricultural sector, making the case for the improved consideration of gender-related factors in index insurance programmes with smallholder farmers.

**Climate change challenges facing South African agriculture**

The South African agricultural economy contributes approximately 2.5% of GDP (DAFF 2016) and is responsible for about 9% of formal employment (Wang et al. 2013). The agricultural sector contributes a further 12% to GDP due to post-harvest manufacturing and processing activities (DAFF 2016). The agricultural economy largely exists in two large sectors, a well-developed commercial agriculture sector and a subsistence agriculture sector (Wang et al. 2013). Water availability is the key limiting factor for agricultural production in South Africa (Wang et al. 2013). The country is the thirtieth driest in the world (Hedden and Cilliers 2014) where rainfall is unevenly distributed on a spatial scale, generally increasing from west to east (Gbetibouo, Ringler, and Hassan 2010). Rainfall in South Africa displays strong inter-annual variability, with prolonged droughts and dry periods (Gbetibouo, Ringler, and Hassan 2010).

Provinces in South Africa experience different levels of livelihood vulnerability due to differing social and economic development (Gbetibouo, Ringler, and Hassan 2010). Out of the nine provinces of South Africa, three contain more than half of the agricultural households in the country: Kwa-Zulu Natal (23%), Eastern Cape (21.3%), and Limpopo (16.6%). These three provinces also have the highest number of female-headed agricultural households and of households headed by children. The climate shock vulnerability map in Figure 1 depicts a vulnerability index of South African provinces using six criteria; (1) percentage of agricultural households per province; (2) percentage of households reliant on only rainfed agriculture; (3) percentage of GDP dependent on agriculture per province; (4) unemployment rate per province; (5) percentage of agricultural households without access to a flushing toilet; and (6) percentage of agricultural households which have experienced
no schooling (see Appendix). These criteria were chosen to represent factors in smallholder farmers livelihoods that may affect their capacity to adapt to climate change. Also considered were some of the indices used by Gbetibouo, Ringler, and Hassan (2010) in a study of vulnerability of the South African agricultural sector. The indices chosen to be used were literacy rate, unemployment rate and provincial GDP share in agriculture. Given the high number of female-headed households in the three provinces, it is critically important that gender-related agricultural factors be included in planning or initiatives for smallholders, including insurance provision.

**Companies providing agricultural insurance in South Africa**

In South Africa, there are only a few private insurance companies that provide agricultural insurance to farmers and pastoralists. According to Roberts, Struwig, and Gordon (2016) the most popular insurance product held in South Africa is an account with a burial society, serving as a form of social protection (Roberts, Struwig, and Gordon 2016). The share of respondents with an account with a burial society increased between 2011 and 15 (from 19% to 28%), with poorer populations purchasing this insurance.

Table 1 provides an overview of private sector insurance providers for the agriculture sector in South Africa. To date, agricultural insurance in South Africa has tended to focus on commercial farmers. The South African Insurance Association (SAIA) has indicated that there are currently no index insurance programmes for agriculture in South Africa, although a pilot project may soon begin with a partnership between insurers and national government (SAIA, pers. comm).¹

**Gender, agriculture and South Africa**

Identifying policy entry points that support a focus on gender equity in South Africa can be useful to map institutional entry points for an equality focus on smallholder farmers. Planning strategies and
resource allocations in agriculture can influence service provision and private sector incentives (including insurance). A range of national mandates exist on gender equality and empowerment in South Africa. The National Policy Framework for Women’s Empowerment defines gender equity as “fair and just distribution of all means of opportunities and resources between men and women”. The Draft Strategic Framework on Gender and Women’s Economic Empowerment prepared by the Department of Trade and Industry of South Africa (DTI) was published in 2006. The Codes of Good Practice for Broad-Based Black Economic Empowerment (BBBEE) of 2003 describe practices for compliance with different levels of BBBEE for businesses. There is an emphasis on including black women, black youths and black people in rural areas as beneficiaries on BBBEE scorecards for businesses.

The Integrated Growth and Development Plan (IGDP) of 2012 for Agriculture, Forestry and Fisheries (DAFF) identifies a lack of access to information as one of the barriers smallholders encounter in the pursuit of their own empowerment. The IGDP includes equity in the agricultural sector as part of its vision statement. Equity in terms of gender and access to information is identified as a challenge facing the sector. IGDP appears to only have gender disaggregated data for forestry, where the percentage of black women engaged in different forestry activities is detailed.

The South African policy framework specifically mentions the lack of access that women have to credit, land, marketing information and technology, thus reducing their contribution to agricultural production. The National Policy Framework for Women’s Empowerment and Gender Equality highlights that women continue to have limited access to land and control over resources in South Africa due to historical factors and unequal gender relations. Land tenure is often the only collateral accepted in debt markets or by banks.

Bearing in mind that it is difficult to define land ownership or legal right to land (Doss et al. 2017) women’s ability to claim land entitlements can described as more variable because they often face more obstacles than men. In instances where women can inherit land, it is possible that they must forfeit control to male relatives. Land reform sometimes fails to include women, where women

| Insurance company | Agricultural insurance products offered | Website | Provinces insurance is offered | Types of farmer covered | BBBEE certificate accessible online |
|-------------------|---------------------------------------|---------|-------------------------------|-------------------------|-----------------------------------|
| Santam            | Offers indemnity insurance to farmers. Asset, game, crop and dairy insurance | www.santam.co.za | All provinces | Commercial | Yes |
| Standard Bank     | Crop, livestock and farming equipment insurance | www.standardbank.co.za | All provinces | Small-scale and commercial Commercial | Yes |
| MSB Insurance Administrators | Crop and livestock insurance | www.msbia.co.za | All provinces | Commercial | No |
| Hollard           | Livestock and pedigreed animal insurance | www.hollard.co.za | All provinces | Small-scale and commercial | Yes |
| Old Mutual Insure | Crop, livestock, irrigation systems and building insurance | www.oldmutual.co.za/insure | All provinces | Commercial | Yes |
| Land Bank Insurance Company | Crop, livestock and asset insurance | www.landbank.co.za | All provinces | Smallholder and commercial | Yes |
| AgriSeker         | Crop and asset insurance | www.agriseker.co.za | All provinces | Smallholder and commercial Commercial | No |
| First National Bank | Livestock, game, buildings and equipment insurance Property damage, machinery breakdown, crop and livestock insurance | www.fnb.co.za | All provinces | Commercial | Yes |
| Nedbank           | | www.nedbankinsurance.co.za | All provinces | Commercial | Yes |

Notes: While different types of agricultural insurance are offered in all provinces, the type of crop insured determines in which province a farmer can buy insurance.

*Broad-Based Black Economic Empowerment (BBBEE).*
tend to have less information on procedures for accessing land than men. Capacity building targeted at women is cited in the National Policy Framework as a way to increase their participation in land reform programmes.

South Africa has recognised gender equality and empowerment as policy issues; has a mandate to rectify inequalities; and codes of good practice for business exist. If index-linked insurance in the agriculture sector is accepted as a relevant CSA practice, pilot schemes may first be necessary to determine whether such insurance is beneficial for smallholders in provinces that display livelihood vulnerability and high numbers of female-headed households. However such pilot schemes should be carefully designed. What can South Africa learn about gender and index-linked insurance in agriculture from other countries?

**Trust is a powerful currency that is linked to financial literacy**

Multiple reviews of agri-insurance highlight lack of trust as a limiting factor to insurance uptake, particularly index-based agri-insurance (Greatrex et al. 2015). A study in Bangladesh found that the levels of trust associated with institutions could be categorised by gender (Akter et al. 2015), with women who had been the victims of financial fraud before less trusting that the insurance scheme would pay out than men. Women who had experienced financial fraud in the past tended not to trust local financial institutions when compared to those who had not experienced fraud, and preferred their insurance provider to be government banks (Akter et al. 2015). Three quarters of women in this study also stated that they rely on male household members to make financial decisions, citing their lack of high education as a reason for this. To overcome these challenges, Akter et al. (2015) recommend investing in increasing institutional credibility; investing in programmes aimed at boosting women’s financial literacy; and making weather index insurance forms and processes simpler to increase understanding. Cai, de Janvry, and Sadoulet (2014) found that modest financial training significantly improved the uptake of index insurance in a study of 200 villages in Jiangxi, China. Carter et al. (2014) suggest the importance of optimising social networks for the circulation of knowledge about insurance and finance. Whether South African smallholders, particularly female-headed households, would trust agriculture insurance products offered by insurance companies remains to be determined.

In some cases, when an initiative is endorsed by government, it is trusted, while in other cases some rural populations may not fully trust the government. Patt et al. (2009) suggest that clear regulations by the government or the insurance industry can help build trust and is a way to ensure that contracts are fair and transparent (and that claims are prompt and reliable).

**Bundling services as a strategy for increased insurance uptake among smallholders**

If trust in institutions is limiting insurance uptake, improved arrangements between the public and private sectors towards a shared objective for the improvement of livelihoods may be feasible. Such public-private partnerships can allow for the bundling of services and a reduction of risk. For example, partnerships between banks, research institutions, mobile network providers, government agencies and insurance providers can be formed to support index insurance. Patt et al. (2009) suggest that piggybacking insurance schemes onto pre-existing programmes (that have managed successful projects) to encourage trust in institutions providing insurance. Bundling provisions with burial insurance may be worthwhile to consider in South Africa, or introducing the concept of index insurance as an agricultural risk management tool via agricultural training and extension (Patt et al. 2009). ACRE attribute their rapid scaling and demand for agriculture insurance to their wide range of partners (Greatrex et al. 2015). The R4 Rural Resilience Initiative (R4) is an example of a public-private-partnership for vulnerable women and men to manage risk in the face of climate shocks. Originally started in Ethiopia, R4 has expanded to Senegal, Malawi and Zambia. The risk management strategies in R4 means that insurance is bundled with credit and savings programmes, allowing for investment in inputs like improved seeds and fertilisers (R4 2016). The impact of R4 in Ethiopia on farmers and
pastoralists includes an increased level of grain reserves compared to uninsured farmers and an increased number of oxen of insured farmers compared to the uninsured (Greatrex et al. 2015). How women are further benefiting from increased grain reserves will be useful information for the future, and may help in building confidence in index insurance, provided such information is transmitted via channels that women trust.

**Designing an insurance pilot for smallholders**

Focusing on bottom-up consultation may be important to ensure a pilot programme is carefully designed and focused on the right crops for both women and men. If land tenure is required, bottom-up consultations will demonstrate who actually has land rights. A yield-based insurance programme in Tamil Nadu, India showed high levels of satisfaction by farmers which was attributed to a farmer-driven design (Zevenbergen 2014). It is also important that the institutions offering index insurance make an effort to ensure that their product and concepts (like basis risk) are well understood by both women and men. There is evidence that role play or scenario games can be valuable tools in establishing trust and in increasing understanding of how index insurance works when first introduced (Peterson 2012; Tadesse, Shiferaw, and Erenstein 2015).

Indicators on male and female involvement and sex disaggregated data will help inform index programmes, in particular it may help design more farmer-driven and tailored products. Even if collected, an institutional challenge is to ensure that such data are analysed. In Tamil Nadu, data for satisfaction levels for men and women farmers were not collected. Nevertheless, farmers had input into the design of the product, with a formal feedback and assessment process where chosen farmers could represent their community (Zevenbergen 2014). R4 in Ethiopia is tracking gender indicators, with their quarterly report of 2016 having gender-disaggregated data for each risk management strategy and for each region. For example, in Tigray there were 437 insured farmers who were trained on savings, credit and income-generating activities, 243 of which were women (R4 2016). While such information is an important step, it provides a partial picture. The report does not yet fully identify the constraints women smallholders face in accessing risk management strategies, which may be useful for tailoring activities. To date, the focus seems to be mainly on participation of women, which is a useful starting point.

Before investing in an index-based agricultural insurance programme a “dry run” is often recommended (Greatrex et al. 2015). R4 call the dry run the first year of the project, which involves consulting with farmers and local experts to design an initial index and develop capacity. The second year involves rolling out the programme to many more farmers while continuing refinement and scaling (Greatrex et al. 2015). This strategy of using a controlled environment to test feasibility appears to be effective, as the number of farmers insured under the R4 initiative grew from 200 in 2009–24,000 in 2014 (R4 2016).

These types of consultative or participatory processes can be useful in designing and scaling out a viable index insurance programme, but may initially counter efforts to keep transaction costs low. However, just because the introduction of an initiative is consultative and participatory in nature, this does not necessarily ensure that the process is also gender sensitive (Cornwall 2003). Deliberately involving both male and female farmers in product design will be important for scale-out of index insurance in South Africa.

In addition to the use of participatory processes for product design, Yuzva et al. (2018) recommend the use of more sophisticated insurance contracts so that the index more accurately represents actual crop losses. Although, this may reduce basis risk, Greatrex et al. (2015) argue that it is important that contracts are simple enough for farmers to understand and therefore trust.

**Financial literacy and insurance payments**

The use of mobile phones to deliver insurance payouts can increase efficiency and decrease transaction costs (Cole 2015), and could potentially help in scaling out index insurance. Murray (2015)
highlighted that mobile phone technology can make it easier to ensure cash payments go directly to women, contributing to “economic empowerment”. It is often alleged that women generally have less access to and use fewer ICTs than men in developing countries (Huyer 2012). Despite the promise of weather forecast bulletins as potential benefits of mobile phones (UNCTAD 2014), literacy to read weather forecasts and cash payments can be low in some rural areas. Gender differences are apparent from a number of studies of financial literacy. In some instances, financial literacy training may be lacking, where women have been found to have less fully grasped financial concepts than men (Akter et al. 2016), possibly due to having fewer years in formal education. In contrast, a 2015 South African Survey on financial literacy did not find any statistically significant correlation between financial literacy and gender (Roberts, Struwig, and Gordon 2016). Awareness of formal financial products was positively correlated with household resources. Wealthier individuals were more likely to answer interest rate questions correctly, while marriage encouraged individuals to acquire better levels of financial knowledge (Roberts, Struwig, and Gordon 2016).

Limited phone reception could be a potential problem in using mobile payouts as farmers may live in areas not covered by service providers (Greatrex et al. 2015). The question of mobile phone ownership and use of smart phones in a region can be difficult to determine. In a study of the use of mobile phones by youths, Porter et al. (2012) found that slightly more females used phones than males in South Africa. The study looked at mobile phone usage in a week among 9–18 year olds in South Africa and found that 62.1% of females had used a phone that week compared to 51.2% of males (Porter et al. 2012). It should be noted that in addition to only investigating youths, this trend does not differentiate between rural and urban populations so is unlikely to be reflective of smallholder farmers’ mobile phone use. Nonetheless, such studies illustrate that mobile phone usage (including for index-based agricultural insurance) may be gender differentiation in different contexts. Trends in ownership disaggregated by region, age and sex should be considered when designing and scaling out index insurance programmes in South Africa. Gender aggregated data for mobile phone ownership by farmers in South Africa may be difficult to obtain, but efforts can be made through service providers and would be a useful reference point.

Institutions in South Africa for scaling out index insurance and for ensuring gender equality

A range of institutions in South Africa were identified as having potential to help to advocate or provide support for index insurance as an agricultural risk management tool (Table 2). For instance, the Micro-Agricultural Financial Institutions of South Africa (MAFISA) aims to establish an agricultural credit scheme by offering loans to smallholder farmers from historically disadvantaged backgrounds. MAFISA’s service could potentially be combined with insurance schemes to provide a bundled service package to farmers. This type of arrangement was put in place by the Agricultural and Climate Risk Enterprise (ACRE) in East Africa.

The Department of Agriculture, Forestry and Fisheries (DAFF) owns the Land and Agricultural Development Bank of South Africa (Land Bank). The Land Bank does not receive funding from the government and competes in the market for resources. As a government owned agricultural financier, the Land Bank aims to bring previously marginalised farmers into the mainstream agricultural sector. However, financial services are targeted at the commercial agricultural sector rather than smallholders. Financing by the Land Bank is aimed at “historically disadvantaged” farmers, although this category of farmers does not seem to be fully defined in their policy. They also aim to remove the legacy of racial and gender discrimination in agriculture.

The Agricultural Research Council (ARC) conducts research for the development of the agricultural sector in South Africa. ARC has participated in the Land Degradation Assessment of Drylands, submitting reports to international organisations for numerous regions in South Africa. These assessments have considered gender roles in land resource management, such as women weeding and managing the fields, and men fencing the fields and ploughing with donkeys in Ga-Kgatla Village. ARC could be
useful in supporting the inception of a pilot index insurance product and guide the process of considering gender in the design and scale-up.

The South African Weather Service (SAWS) is an agency of the Department of Environmental Affairs (DEA) and provides public and commercial services and may be a useful partner for scaling out index insurance. Their weather stations could be instrumental in establishing a weather index and rolling out insurance pilots. The Climate Systems Analysis Group (CSAG), based at the University of Cape Town, conducts research around weather forecasting and its use for farmers, both commercial and smallholder. For example, Ncube et al. (2016) examined household vulnerability and CSA, taking gender into account in their vulnerability assessment.

According to the vulnerability index in Figure 1, Limpopo, Mpumalanga, Kwa-Zulu Natal and the Eastern Cape are the most vulnerable provinces in the context of agricultural and socio-economic circumstances. A weather index insurance (WII) pilot in these regions would have high potential to target the smallholder farmers experiencing climate risk most threatening to their livelihoods. Often WII programmes do not attract clients most vulnerable to weather shocks (Akter et al. 2016), thus the vulnerability index here may provide a preliminary method for identifying farmers most in need of climate risk management. Maize is a staple food crop in South Africa and is grown across large parts of Mpumalanga, Kwa-Zulu Natal and Limpopo (Wang et al. 2013). Beginning with a WII product targeted at maize growers in vulnerable regions could prove effective as a pilot with potential to scale-out and include more regions and crops.

Moving beyond South Africa, the Food, Agriculture and Natural Resources Policy Analysis Network (FANRPAN) is an inter-sectoral platform that has country-level nodes. FANRPAN promotes policy in food and agriculture by facilitating partnerships between government and civil society and supporting policy research. FANRPAN has organised training in the past for various stakeholders, targeting subjects ranging from conservation agriculture to climate change leadership and policy advocacy. The organisation addresses gender in climate change policy and could be useful for capacity development on gender, insurance or agricultural finance in the region.

The African Union established the African Risk Capacity agency to help improve the ability of African member states to plan, prepare and respond to natural disasters and extreme weather events so that food security of vulnerable populations is also protected (ARC 2018). The Conference of the Parties (i.e. 26 member states) to the agency are all part of an index-insurance initiative. Although South Africa is not a member of African Risk Capacity, joining may have several benefits for South Africa including being part of a network that has experience in implementing insurance schemes for smallholders.

### Table 2. Institutions that can support scaling out of index insurance in South Africa.

| Activity to support provision of index insurance to smallholders in South Africa | Example of institution that could support or implement the activity |
|---|---|
| Participatory design of insurance products | Farmers co-operatives, National Agricultural Marketing Council, Southern African Confederation of Agricultural Unions, Land Bank, Department of Agriculture, Forestry and Fisheries |
| Designing indices for insurance product | Statistics South Africa, South African Weather Service, Forum for Agricultural Research in Africa, Agricultural Research Council, Climate Systems Analysis Group |
| Integrating insurance with development interventions | Comprehensive Africa Agriculture Development Programme, South African Development Community, Department of Environmental Affairs, Department of Agriculture, Forestry and Fisheries, Department of Rural Development and Land Reform, Consortium of International Agricultural Research Centres, Micro-Agricultural Financial Institutions of South Africa |
| Institutions for knowledge sharing and learning | Land Bank, Department of Environmental Affairs, Department of Agriculture, Forestry and Fisheries, Department of Rural Development and Land Reform, African Food Security Urban Network, African Union, Agricultural Research Council, Food, Agriculture and Natural Resources Policy Analysis Network, South African Insurance Association, Consortium of International Agricultural Research Centres, Micro-Agricultural Financial Institutions of South Africa |
Conclusions

While index insurance is an agricultural risk management tool that holds potential for smallholder farmers in South Africa, it is not a panacea for all climate-related risks experienced by smallholder farmers. It is one tool among others which can be leveraged to help male and female vulnerable farmers to better respond to climate risk.

This paper has highlighted lessons learnt from existing index insurance programmes (from Ethiopia, India and Bangladesh) from a gender equality perspective. Key issues identified included: ensuring information and technology reaches poorer smallholders, building trust of financial institutions among both male and female smallholder farmers, public private partnerships, and linking to existing institutions. Using national gender equality mandates to focus attention on female-headed households was also important. In South Africa the lack of access women have to land, resources, and extension services may affect their interest in this form of insurance.

Male and female farmers need to better understand the risks associated with index-based agricultural insurance: that it covers specific events and it is possible that they can experience a loss that is not covered (Patt et al. 2009). South Africa has yet to implement any index insurance projects for farmers. We have outlined institutions in South Africa that could potentially play a pivotal role in building trust, by including smallholder farmers in product design and maintaining communication with clients. Clearly, a high level of trust in an institution is required before farmers will purchase weather-indexed insurance. Trust can be built by emulating the consultative and participatory efforts that have been proven to work in pilot initiatives elsewhere. In some contexts, partnership with national government agencies may help to build trust. Public-private partnership initiatives may be effective for establishing trust in index insurance. In parallel, financial education programmes need to be adapted in order to become more effective (Wentzel 2016). If there are plans to begin implementation, which according to the SAIA there are (pers comm, 2018); a different approach involving financial literacy for smallholder farmers should be considered, building on lessons from those who have worked in this area (Wentzel 2016).

However, index-based insurance as a CSA risk management tool may not be effective in every circumstance. There are still many challenges with index insurance such as basis risk, data management and communication with clients (FAO 2013). In addition, some of these challenges have gender dimensions. Pilot-based approaches for the scale-out of index insurance in South Africa are necessary. Gender-sensitive consultative methods should be employed to allow farmers involvement in the design of insurance products that serve their needs.

Data on the gender situation in agricultural insurance are lacking, and if collected would be extremely useful for addressing challenges and barriers to scale-out of index insurance. It is important to stress that rural smallholder farmers are not a homogenous group, and that broad sweeping statements about women in agriculture may be counter-productive to developing and deploying index-insurance products that meet specific needs of specific smallholder communities. This is why a focus on gender can help those involved in index-based insurance to disaggregate smallholders (beyond binary male-female ratios) and move beyond the “one size fits all” approach to scaling out of programmes. Further research is required to examine the nuances of gender in South African smallholder agricultural systems and associated implications for scaling out weather index insurance, in particular methods which insurance companies can use to assess the implications of their products on different smallholder farmer communities.

Note

1. SAIA represent all relevant stakeholders in the short-term insurance industry in the country.

Acknowledgements

Lorna Born acknowledges funding support from the Irish Aid Fellowship Programme. Charles Spillane and Una Murray acknowledge ongoing collaboration and funding support from the CGIAR’s Climate Change, Agriculture and Food Security (CCAFS) programme.
Disclosure statement

No potential conflict of interest was reported by the authors.

Funding

This work was supported by CGIAR Climate Change, Agriculture and Food Security (CCAFS) programme; Embassy of Ireland in South Africa Kader Asmal Fellowship.

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References

Akter, S., T. J. Krupnik, F. Rossi, and F. Khanam. 2015. “Mind the Gender Gap in Farmers’ Preferences for Weather-Index Insurance.” CSISA Research Note.

Akter, S., T. J. Krupnik, F. Rossi, and F. Khanam. 2016. “The Influence of Gender and Product Design on Farmers’ Preferences for Weathered Crop Insurance.” Global Environmental Change 38: 217–229.

ARC. 2018. “Vision and Mission.” Accessed April 20, 2018. www.africanriskcapacity.org/2016/10/29/vision-and-mission.

Asfaw, S., C. Bishop-Sambrook, Y. Diei, I. Firmian, N. E. Henninger, C. Heumesser, S. Huyer, P. Kristjanson, C. Lefter, and S. Lehel. 2015. Gender in Climate-Smart Agriculture: Module 18 for Gender in Agriculture Sourcebook. Washington, DC: World Bank Group.

Bageant, E. R., and C. B. Barrett. 2016. “Are There Gender Differences in Demand for Index-Based Livestock Insurance?” The Journal of Development Studies, 1–21.

Binswanger-Mkhize, H. P. 2012. “Is There Too Much Hype about Index-Based Agricultural Insurance?” Journal of Development Studies 48 (2): 187–200.

Bryan, E., T. T. Deressa, G. A. Gbetibouo, and C. Ringler. 2009. “Adaptation to Climate Change in Ethiopia and South Africa: Options and Constraints.” Environmental Science & Policy 12 (4): 413–426.

Cai, J., A. de Janvry, and E. Sadoulet. 2014. “A Randomized Evaluation of the Effects of an Agricultural Insurance Program on Rural Households’ Behavior: Evidence From China.” Nova Deli: International Initiative for Impact Evaluation, 1–22.

Carter, M., A. de Janvry, E. Sadoulet, and A. Sarris. 2014. “Index-Based Weather Insurance for Developing Countries: A Review of Evidence and a Set of Propositions for Up-Scaling”.

Carter, M., A. de Janvry, E. Sadoulet, and A. Sarris. 2017. “Index Insurance for Developing Country Agriculture: A Reassessment.” Annual Review of Resource Economics 9: 421–438.

Cole, S. 2015. “Overcoming Barriers to Microinsurance Adoption: Evidence From the Field.” The Geneva Papers on Risk and Insurance - Issues and Practice 40 (4): 720–740.

Cole, S., X. Giné, J. Tobacman, P. Topalova, R. Townsend, and J. Vickery. 2013. “Barriers to Household Risk Management: Evidence From India.” American Economic Journal: Applied Economics 5 (1): 104–135.

Collier, B., J. Skees, and B. Barnett. 2009. “Weather Index Insurance and Climate Change: Opportunities and Challenges in Lower Income Countries.” The Geneva Papers on Risk and Insurance - Issues and Practice 34 (3): 401–424.

Cornwall, A. 2003. “Whose Voices? Whose Choices? Reflections on Gender and Participatory Development.” World Development 31 (8): 1325–1342.

DAFF. 2016. “DAFF Annual Report 2015/2016.” Pretoria: Forestry and Fisheries Department of Agriculture.

Delavallade, C., F. Dizon, R. V. Hill, and J.-P. Petraud. 2015. “Managing Risk with Insurance and Savings”.

Doss, C., R. Meinzen-Dick, A. Quisumbing, and S. Theis. 2017. “Women in Agriculture: Four Myths.” Global Food Security 46: 1–32.
Appendix. Indicators used to generate vulnerability index for smallholder farmers in different provinces in South Africa.

| Criterion                                                                 | Western Cape | Eastern Cape | Northern Cape | Free State | Kwa-Zulu Natal | North West | Gauteng | Mpumalanga | Limpopo |
|---------------------------------------------------------------------------|--------------|--------------|---------------|------------|----------------|------------|---------|-------------|---------|
| 1 % agricultural households per province (out of total households)       | 3.0          | 27.9         | 13.8          | 13.4       | 18.6           | 13.4       | 4.9     | 18.2        | 24.1    |
| 2 % agricultural households dependent on only rainfed agriculture per province | 42.7         | 40.4         | 46.3          | 33.7       | 37.8           | 41.0       | 41.2    | 35.2        | 44.3    |
| 3 % of GDP dependent on agriculture per province                          | 22.6         | 5.0          | 6.1           | 10.3       | 26.8           | 6.2        | 6.0     | 9.0         | 8.1     |
| 4 % unemployment per province                                             | 20.7         | 34.4         | 30.5          | 34.4       | 24.0           | 27.2       | 29.9    | 32.3        | 20.8    |
| 5 % agricultural households without flushing toilet per province          | 4.3          | 86.3         | 48.2          | 44.4       | 83.0           | 72.2       | 21.1    | 73.8        | 87.6    |
| 6 % agricultural households with no schooling per province                | 3.6          | 17.2         | 17.1          | 10.7       | 22.7           | 16.7       | 7.6     | 26.3        | 24.0    |
| Sum of all 6 percentage criteria                                           | 96.9         | 211.2        | 162           | 146.9      | 212.9          | 176.7      | 110.7   | 194.8       | 208.9   |
| Vulnerability index out of 100* (Sum/6)                                   | **16.15**    | **35.2**     | **27**        | **24.5**   | **35.5**       | **29.5**   | **18.5**| **32.5**    | **34.8**|

Notes: *Vulnerability index was calculated using the following formula for each province: (Criterion 1 + Criterion 2 + Criterion 3 + Criterion 4 + Criterion 5 + Criterion 6)/6 = Vulnerability index out of 100.