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THE PROMISE AND PITFALLS OF INDEX INSURANCE: BUILDING RESILIENCE THROUGH RESPONSIBLE IMPLEMENTATION

PRESENTATION AUDIO TRANSCRIPT

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Julie MacCartee: Hello, everyone. On behalf of Agrilinks, Marketlinks, Feed the Future, and the USAID Bureau for Food Security, I would like to welcome you to our webinar today on the Promise and Pitfalls of Index Insurance: Building Resilience through Responsible Implementation. We're going to have a great discussion today about agricultural and livestock-based index insurance as a development tool and the emerging evidence base around its efficacy.

My name is Julie MacCartee, and I'm a knowledge management and learning specialist with the USAID Bureau for Food Security, and if you've attended an Agrilinks Webinar in the past, you've probably heard my voice. I will be your webinar facilitator today, so you'll hear me throughout the webinar, especially during our Q&A session at the end of the presentations.

Before we dive into the content, I would just like to go over a few items to orient you to the webinar. First, please do use the chat box to introduce yourself and to let us know where you're joining from. The chat box is your main way to communicate today, and we encourage you to use it to post questions at any time, to share resources, and to discuss the topic with your colleagues. And I can see that lots of you have already introduced yourselves, which is great. Thank you very much for saying hello.

We'll be collecting your questions throughout the webinar, and we'll try to answer some of them in the chat box along the way. And the rest we'll hold until after the presentations.

You'll see that the slides are available for download in the box on the left of your screen, if you'd like to grab a copy now, and they'll also be posted on Agrilinks. And we have a couple of other recommended resources in the file downloads box for you.

And lastly, we are recording this webinar, and we will email you the recording, the transcript, and any additional resources once they are ready in about a week or a little more than a week's time.

All right. I am going to go ahead and introduce our speakers, and then we can get started with our content today. First up will be Jennifer Cisse, who is the senior risk advisor in USAID's Bureau for Food Security in the Office of Market and Partnership Innovation. Jennifer manages BFS's insurance-related activities, and provides technical assistance on resilience, risk management, and index insurance. And she will frame the conversation with an overview of how index insurance ties into USAID's risk and resilience work.

And then next – oh, there's Jennifer. Great. And then next up will be Tara Chiu, who is the assistant director of the Feed the Future Innovation Lab for Assets and

Market Access, based at the University of California Davis. In this role, she provides both administrative and strategic support for a wide portfolio of resources focused around the topics of risk management and resilience, including the I4, Index Insurance Innovation Initiative.

And then we will move to Michael Carter, who is the director of the Feed the Future Innovation Lab for Assets and Market Assess and the I4, Index Insurance Innovation Initiative. He is also a professor of agricultural and resource economics at the University of California Davis, and among other efforts, his research features a suite of projects that design, pilot, and evaluate index insurance contracts as mechanisms to alleviate chronic poverty.

So we've got some really exciting experts on the webinar today, and I'm going to go ahead and pass the microphone over to Jen.

Jennifer Cisse: Great. Thank you, Julie. My name, as Julie mentioned, is Jen Cisse. I'm a senior risk advisor in the Bureau for Food Security. As Julie mentioned, I manage our centrally funded insurance portfolio out of Washington, DC, including our work with the Feed the Future Innovation Lab for Assets and Market Access. So before we get into the specifics of index insurance, I would like to take a few minutes to frame the conversation by looking at insurance within the broader risk and resilience landscape.

As I think you all know, the Feed the Future Initiative is the US government's global hunger and food security initiative. On this slide, there's a bit of information about the Feed the Future initiative, but what you may not remember is that it was launched in 2010 by the US government to address global hunger and food insecurity in response to the food crisis of 2007 and 2008. So this was really an early, pre-2011 response to risk and its impact on food security.

And the Feed the Future initiative supports USAID's Innovation Labs, including the Assets and Market Access Innovation Lab, which is where Tara and Michael are joining us from today.

So a little bit after the launch of the first phase of Feed the Future, in 2012, the global community started working on the Sendai framework for disaster risk reduction. And this came out – this was a follow-on to the Hyogo framework, and it highlighted four priorities for action: understanding disaster risk, strengthening disaster risk governance to manage disaster risk, investing in disaster risk reduction for resilience, and enhancing disaster preparedness for effective response and to build back better in recovery, rehabilitation, and reconstruction.

So I think it's just interesting to think about the international community in the disaster risk reduction priorities and how insurance fits into these. I think insurance specifically touches on the first two of these, understanding disaster risk and strengthening disaster risk governance to manage disaster risk. And insurance is a great tool for not only helping understand disaster risk, but also communicating that to potential clients.

Around the same time, in 2012, in response to the droughts in 2011 and 2012, and our experience in the Horn of Africa _____, USAID came out with policy and program guidance on resilience, Building Resilience to Recurrent Crisis, and you can still find this guidance document online, and I can share it in the chat box later, for those who don't have it.

But I really wanted to talk about where that brings us today. So currently, Feed the Future resilience and livelihood diversification guidance discusses pathways for managing livelihood risk. So this is kind of some of the current thinking at USAID in terms of how households can manage livelihood risk, and how insurance fits in.
So as you can see, households who are facing risk may want to diversify their livelihoods to reduce exposure to climate, or they may want to buffer their climate risk through climate smart agriculture and accumulation of assets and income, and through things like insurance.

If you look at the different options here that households have when they're thinking about working on their livelihoods, they have the option to move out of agriculture completely, which avoids exposure to climate risk potentially by working in non-agricultural livelihoods. They have the option to step out, which is to partly step out of agriculture. But what insurance really can help households do is to step up in agriculture by helping households manage the risks that they face in agriculture, and then incentivizing them to invest on farm. So this is really how we're thinking about insurance with regards to the global food security strategy.

What are the strategies for managing livelihood risk, and how does insurance fit in? When we talk about risk management, we're really talking about a collection of different types of strategies and approaches. There's risk reduction, risk mitigation, risk coping, and risk transfer. So mitigation is risk avoidance, which is what we were just talking about with moving out of agriculture, or perhaps diversifying the livelihood, so that part of the livelihood of the households is not in agriculture or agriculture-related livelihoods or jobs.

We can reduce exposure by focusing on perhaps drought tolerant inputs, irrigation, etcetera, other technologies that may reduce the impact of, for example, drought on agriculture.

Of course, USAID does a lot of work in helping households cope with risk, and we want to avoid – help households avoid negative coping strategies, such as decreasing consumption or selling productive assets. So when we talk about financial inclusion, we're really interested in how savings can help households cope with risk.

And then we talk about risk transfer, and that's where insurance really comes in. So that's a way of taking advantage of the market, and sometimes, it's a combination of public and private actors to help households move that risk away from themselves and on to, for example, an insurance company.

So bringing us back to Feed the Future, we can see how insurance fits into the global food security strategy. I think it's pretty clear that index insurance in agriculture really contributes directly to objectives one and two, particularly IR5, which has to do with risk management specifically, but also to IRs 1 and 2, because we're hoping that through access to insurance, households will invest on farm, increasing their productivity and income.

But also, insurance can help indirectly contribute to objective three, which is a well-nourished population, by reducing negative coping strategies, such as decreasing consumption.

So just to sum up quickly, insurance may help households step up in agriculture and increase on farm investment, but it is important to point out that insurance is only one component of risk management, and households may still want to mitigate risk by diversifying off farm into livelihoods with less climate risk exposure.

However, one of the reasons we're here today is that there has been a lot of excitement in agricultural index insurance, which I think is warranted, but poor quality and unsafe products may actually do more harm than good. So I'm now going to turn it over to Tara Chiu – my contact information is here for those who would like to get in touch – so that they can delve more into not just some of the benefits as I just briefly mentioned of index insurance, but also some of the potential pitfalls and things that we can do to help make sure that insurance products do no harm. Thank you.

Tara Chiu: Hi. So I would like to start by talking about some of the AMA Innovation Lab's research on insurance today, and we've done a lot of work designing, piloting, and testing agricultural index insurance around the world, and built a pretty good evidence base for its potential impacts, as well as potential pitfalls.

The way we think about the role of agricultural index insurance is linked to the way we view risk. Risk, decades of evidence around risk and development, have indicated that risk makes people poorer when a shock occurs by reducing their incomes and destroying their assets, but in addition, it keeps people poor by discouraging investment and distorting patterns of asset accumulation.

And this is something Jen already referred to, but by protecting households against the worst consequences of adverse shocks, index insurance should not only prevent households from using costly coping mechanisms, such as selling out remaining assets, reducing consumption, pulling children out of school, but it should also allow households to invest more in risky but potentially high returning activities. So this is the way in which we see agricultural index insurance playing a role to both accelerate and then protect economic growth for smallholder farmers.

So first, when we look at the evidence about coping after a shock, after a drought occurs, we found that – and this is based on evidence from index-based livestock insurance for pastoralists in Northern Kenya – we found that for relatively poorer households, they tend to reduce consumption rather than selling off their remaining assets when a shock occurs, which can lead to really long term negative impacts, such as _____ of children under five, which in turn can lead to the intergenerational transfer of poverty.

We found for these types of households, the relatively poor insured households reduced use of this strategy by roughly 62 percent. And then for those households that are relatively well off, they may sell off remaining assets to smooth their consumption. This can place households in a poverty trap if they no longer have the minimum assets needed to maintain their livelihood in future years. For these households, they reduced use of distressed asset sales by 70 percent.

But we've also found good results, positive results, before the drought occurs. For example, in an impact evaluation of index-based insurance in Mali for cotton farmers, farmers even before anything occurred, by the confidence that insurance gave them, increased the area cultivated, increased use of loans for investment, and increased their productive investment. In Ghana, looking at credit assets and inclusive assets for credit, an index interlinked with credit – an index insurance linked with credit found that – it induced women to increase their loan applications by roughly 15 to 17 percent, and when it's designed in such a way that the payouts go first to repay the balance of the loan, and then the surplus to the borrower, the insured individual, that increased loan approval rates by the bank 32 percent.

So we've seen promising results both before and after the drought, but quality matters, and that's what we're here to talk about today. Not all contracts worked

the way that we envision that they should, in terms of providing reliable protection against drought.

So looking at this graph, the blue marks that you see intersect at the money paid out by the government subsidized index insurance, and then against the – and the proportion of the estimated loss, against the area-wide average yield, as a percentage of average historical yields in that area, over – I think this was over an eight year period.

So the red line is the average – the red line you see running horizontally is the average of those individual payments. And so basically what this is showing is that the average payments were roughly the same, whether the farmers on average suffered a total drop loss or had a drop loss that was double the historical average. That's didn't really work well in terms of being able to reduce the negative costly coping mechanisms we see, both in terms of after a drought occurs and in terms of missing opportunities before a drought occurs.

So the stakes are high here. When an index insurance contract fails, a farmer may be worse off than she would have been without insurance. She'll have lost not only her crop, but the money she spent on the insurance premium. She may be forced to default on any loans she took as a result of having the confidence that the insurance gave her, and then, in the end, she may have to resort to the historic – the negative coping mechanisms we've seen in the past, such as asset sales, meal reduction, or withdrawing children from school. Further, in the bigger picture, these failures sow distrust for an otherwise promising tool by sabotaging the impacts that are possible with high quality contracts.

So with that, I'd like to pass it off to Michael to go in greater depth about how we might recognize whether or not an insurance product is or is not quality, and how we can work to build stronger products in general.

Michael Carter: Okay. Thank you, Tara, and good morning, afternoon, and evening to everybody, wherever you might be.

So what I would like to do is talk a little bit about quality standards, why they matter, and how we might design contracts to meet those quality standards. So Tara's already given us a nice introduction on some of the impacts that index insurance can have, helping farmers move up, as Jen put it in her comments. So while the evidence such as that summarized by Tara is very promising, there are also some fairly spectacular instances of index insurance failure that have occurred. I think there was an article in *The Economist* not too long ago that said there should be malpractice for index insurance. So I think we need to take these quality concerns quite seriously.

So what I'm going to talk to you about initially is trying to conceptualize and think about and actually measure index insurance quality. In very simple terms, when we say a quality index insurance, we mean one that adequately protects farmers against income fluctuations. And if it does that, then we might anticipate – we might anticipate that actually offering agricultural insurance will achieve some of the development objectives that we're looking for.

Let's jump right in and kind of think about this. I've been talking about this for a while, and I'm going to try some stuff out on – try some ideas out, and ways of presenting this that I hope will resonate with all of us.

I think the best way to start thinking about index insurance quality is to recognize that quality of an index insurance contract is a – is what might be called a hidden trait. There's a picture there on your screen. This is a woman in Marsabit in Northern Kenya. She's very proudly holding an index insurance contract which she purchased as part of the index-based livestock insurance project there in that part of the world. And she's holding that contract, but whether that contract is reliable or not, she can't tell by looking at a piece of paper. The paper's nicely printed, and it says all sorts of indecipherable probably things on it, but she can't tell by just looking at the contract with it.

The problem, of course, is – part of the problem is that not only is the quality of an index insurance contract not immediately visible to the consumer, creating a quality contract is at least somewhat more costly than creating a low quality kind of contract.

The hidden trait problem of index insurance is certainly not unique. If we think about maize seed, for example, holding a maize seed in your hand, you can't tell whether that's a hybrid seed that's going to give you four tons per hectare, or whether it's a lower quality seed. You can't tell whether that seed is a little old and may not germinate.

And so when we think about things like hybrid seeds, just about every country that I know about has at least some effort to certify seed quality, precisely because it's an index insurance. And governments want farmers to have the confidence that if they pay good money for something with a hidden trait, that the trait is actually there, and will not fail the farmer. So we have sort of a – we have an analogue – we have an analogue issue in insurance.

There's been a little bit of work done in my domain of economics suggesting that when you have this problem of hidden trait in the context of insurance, an unregulated market or a market that doesn't have any quality externally – external quality standards in it, can reach what you might call a junk insurance

equilibrium. That is, the low quality insurance contracts will drive out any good quality insurance contract, and in the end, the demand for the insurance ends up being low, and the kinds of things we hope insurance can allow and enable farmers to do in fact may not happen.

So in a sense, to use kind of economistic language, there's a public good case for certifying index insurance quality, either through public regulatory authorities, which is what we typically see in the case of maize seeds, or we could also think about an industry sponsored but independent, private lab that certifies quality.

A good example in many parts – certainly in the US and many other places I've been, we might see electrical appliances that have a little sticker on them that say UL for Underwriter Labs. I think it's interesting to think about the history of that. The Underwriter Labs was actually formed at the time of the Chicago World's Fair in about 1900, and the electrical devices were quite novel at that time, and there was concern that these new devices might actually start fires, which they in fact will, as many of you know, if the device is not well-designed, if the gauge of the wire being used to carry power to the device is not heavy duty enough for the power that's being pulled through.

And Underwriter Labs was formed to certify that these devices were safe, and it's an independent organization, and – that's supported by industry contributions. And in the case of Chicago, it was actually the insurance industry that was insuring the Chicago World's Fair against fires and things like that on all the buildings that had been built, that the insurance companies actually insisted that any electrical device that went into the World's Fair actually have the UL seal of approval. Otherwise, they weren't going to insure the World's Fair against this. So it's kind of a nice example of the private sector on its own insisting on and enforcing rules for quality standards.

I think when we come to insurance, it's fairly easy to understand the danger of an unregulated or lack of quality standard of an electrical appliance. I think insurance is a little more complex. Tara showed us a picture that showed that a suite of rainfall-based index insurance contracts in India tended to pay off almost as frequently when conditions were good and when conditions are bad.

And what I want to try to – I'm going to use a simple example, and this is my novel effort here to communicate these ideas. So I want to use a simple example to try to show why we think this is – why this is so important of an issue.

We're going to make a – I'm going to make a real – as simple an example as we can that just tries to draw these issues out. And again, I'm an economist, right, so I like to assume lots of things.

Let's assume that there is only two kinds of worlds or conditions the farmers can experience. They can have a good year, and let's just say when the good year happens, the farmer earns $1,000.00 from their agricultural activity, and that happens 80 percent of the time. But the farmer also faces a 20 percent chance of a bad year, and in those bad years, the farmer earns only $250.00, and that may not be enough to even pay the bills, and hence could induce the kinds of costly coping strategies that Tara and Jen referred to earlier.

The question is what does the farmer do? The farmer can go it alone and face this risk that 1 out of every 5 years, or 20 percent of the time, the bad year happens, or let's imagine the farmer now has available to it an index insurance contract that comes along and pays the farmer $400.00 in bad years.

Initially, to make it real simple and get the ideas clear, let's assume that this is a perfect insurance contract, and the perfect insurance contract only pays the farmer the $400.00 in the bad years, and never pays out in good years. So let's sort of think about what that might look like. The last couple of points on this slide just sort of make the points we're going to – the rest of the assumption under this. So notice this insurance contract, what's called the actuarially fair price is $80.00, so there's a 20 percent chance of the insurance contract paying out the $400.00, so the actuarially fair price is 20 percent times $400.00, or $80.00.

And let's further assume that that insurance contract gets marked up to cover administrative costs, taxes, marketing, etcetera. It gets marked up by 50 percent. So the cost of this insurance contract is going to be $120.00. And the question we want to ask ourselves then is would the farmer be better off going it alone or paying $120.00 for this insurance contract?

The concept we used and that we've been developing at the Assets and Market Access Innovation Lab is a minimum quality standard, and the minimum quality standard is just that if the farmer is better off buying the insurance, better off economically buying the insurance than not buying the insurance, then we'll say that the – we'll say that the contract passes the test.

I'll come back briefly in a moment to note there's a related question which we often talk about in the world of agricultural insurance, is, well, what if the government actually pays the insurance? What if the government fully subsidized the insurance? So the related question is would the household be better off if the government bought them the insurance – that is, provided 100 percent subsidy – or would the household actually be better off if the government just gave them the amount of the subsidy as an annual cash transfer? So those are the questions we want to answer in this particular question.

Here's my simple example. I see somebody already asked about average years. We could average years. It would just add more bars to the graph, but it's not going to change the basic story that we have going on here.

The way to understand this, the horizontal axis shows the income level of the farmers, and we – and the height of the bars represents the probability that an event occurs. When the farmer doesn't have insurance – those are the reddish, orangish bars, whatever colors they appear on your screen, the two outer bars – and we can see that 80 percent of the time without insurance the farmer gets the $1,000.00 income, and then 20 percent of the time the farmer gets the lower income.

And then what insurance does is of course squeezes those two together, so the farmers paying the $120.00 insurance premium, and in good years now the farmer gets the $1,000.00 less the insurance premium, and in bad years, he gets – the farmer pays the insurance premium, but then is compensated with the $400.00 payment, and so the farmer's income is much less dire in bad years. Okay?

Now the average income of households without insurance is going to be $850.00, but with perfect insurance, average income is actually lower. The average income is going to be $810.00, and the difference between those two is actually the $40.00 markup on the insurance. The first thing to note is any time you have insurance, it's actually going to be costing the farmer on average money, and that's because the farmer has to be pay for the money he receives – he or she receives in bad years, and also has to pay for the cost of administration.

The question then is this lower average income worth the stabilization effect of insurance? And so it can be if $1.00 in a time of stress is effectively worth more than $1.00 in a time of plenty. Notice, in this case, the farmer gives up $1.40 in times of plenty in order to get $1.00 in times of stress. And economists have long sort of thought about this problem. Why would someone pay more than $1.00 to get $1.00 back? And that's because in fact money is worth more to us when money is scarce. So when we've had a crop failure and our income is very low, then indeed we might be willing to make this tradeoff of a little less money in order to have the stabilization effect we saw moving those two blue bars in, or more particularly, moving the blue bar in bad state of the world up.

That's sort of the principle of insurance. Then the question is whether any particular insurance is – has the quality or characteristics, which would make farmers want to buy it. This next graph – I apologize – is a little bit complicated. What we're showing on the horizontal axis is the probability that the contract fails, and let’s just starts with the case of perfect failure – of perfect insurance, rather. Perfect insurance is the one when the contract never fails in the bad state

of the world, and that's all the way over at the left hand side, where it says contract failure probability is zero.

Then what we're graphing here is a measure of the – what's called the certain income equivalent of different situations as a function of the state of contract failure. Let's look at the red and the blue lines. And what we can see is the green line is showing that for the farmer who goes it alone, the average income is $850.00, but for a farmer who's risk averse, getting that $850.00 in a random way, sometimes really low, sometimes higher than that, has a risk discounted so called certainty equivalent of only $730.00.

What the downward sloping red line is showing is what's the certainty equivalent of having an insurance contract. And so if we look at the zero failure rate, we can see the certainty equivalent for a risk average farmer is well above – it's about $800.00 – excuse me – it's about $800.00 for the risk averse farmer, which is just a way of saying that this perfect insurance contract easily exceeds the minimum quality standards. That is, a risk averse farmer would be more than happy to pay $120.00 for this insurance, even though it lowers average income. That squeezing together, that lifting up the bad year, is well worth it. So the farmer is happy to give up a little bit of money on average in order to achieve this income stabilization effort.

Now that's the case of perfect insurance, but of course, we know index insurance is in general not perfect. As a lot of people have discussed, index insurance can be a great tool because it reduces the administration cost that makes conventional insurance infeasible for small-scale farmers. By conventional insurance, I mean insurance which is loss adjusted, such that when the farmer has a loss, he has to call the insurance company, someone has to go out and inspect the plot and verify the loss. But the Achilles' heel of index insurance is that it's – the way it's saving money on loss adjustment costs is it's not measuring individual farmer yields and losses. It's simply measuring an index that is correlated with the farmer losses, but it's not the same sort of thing.

That raises the fact that index insurance pays on an index rather than on actually looking at what happened to each individual farmer induces two sorts of problems. The first is it can induce a false negative. That is – sorry, my phone is suddenly telling me – the index insurance with a false negative is not paying the farmer, even though the farmer had a genuine loss, and that's just because of imperfect correlation between the index and what happens to the farmer.

Index insurance can also exhibit what's called a – can exhibit what's called a false positive, and the false positive happens when the index triggers a payment, but again, the farmer's actually not had a loss. Okay? Now that might sound like a good thing, to get money when you didn't actually have a loss, but it's actually a

bad thing, because remember, the farmer in this case is paying $1.40 for every $1.00 the farmer gets back for insurance. So paying $1.40 to get $1.00 might be a good idea when you've had a loss and money is valuable, but it's actually a very bad thing when you've not had a loss, and $1.00 is worth just $1.00.

Let's take these ideas real quickly to our simple example. We're going to assume, to make it real easy, that the false negative probability equals the false positive probability. What we're going to see is that a risk average farmer will be – who would be better off with a perfect insurance, would actually be better off going it alone any time the index insurance contract failure rate becomes too high.

Let's try to understand why that is. This is the same graph we've had before, but now I've added in these failure rates. So we can see, again, the red bars are what happened to the farm – what the farmer faces when there is no insurance. There's the high income in good years, there's the low income in bad years.

What happens to the farmer when there's the possibility of index insurance failure is more complicated. What I really want to focus on is the far blue bar on the left. The far blue bar is the income the farmer faces in bad years when the farmer has paid the insurance premium, and yet the farmer did not actually receive a payment.

As an economist who works on this named Daniel Clark said, and as Tara alluded to, when you have index insurance contracts that can fail you, the worst thing that can happen actually become worse, and we see that in this diagram. When the farmer doesn't have insurance, the worst thing that happens is the farmer has an income of $250.00. When the farmer has an index insurance that can fail him, and it happens 10 percent of the time in this little numerical example, then the farmer has an income of $250.00, but paid an insurance premium of $120.00, and so the income of the farmer is even lower than it would have been without the insurance.

This is really, really important to keep this thing in mind. This is why as we think about index insurance, we need to be very cautious and very wary of index insurance contracts that fail.

Let's then very quickly go back to the same diagram we had before. What we can see here is now – before we talked about perfect insurance, and the bottom two lines showed us that for the risk adverse farmer, the overall economic value of having insurance was well above the economic value of not having insurance. We can see that red line is downward sloping, so that as these failure rates of insurance contract goes up, then the certainty equivalent of having index insurance begins to collapse, and indeed, we can see that when we get to a failure rate of around just below 50 percent, we can see the farmer actually would be

better off from his perspective of household – or her perspective of household wellbeing, the farmer would be better off having no insurance rather than having an insurance that fails him and leaves him in even worse straits in some of the bad states of the world.

This is I think the key issue, is that when we promote insurance, we need to be very careful, because it's actually possible to make people worse off. In the interest of time, I won't say anything more about insurance subsidies, but the top half of this graph is just showing what happens when you have fully subsidized insurance, and would the farmer – it compares whether the farmer would be better off being given the insurance subsidy as a cash transfer, or would the farmer be better off with the insurance. And we can see that if the insurance is of high quality, the farmer would say to the government, I'm better off if you give me free insurance. On the other hand, as the insurance quality collapses, the farmer would actually say no, I would be better off if you just gave me that money every year, rather than giving me an insurance contract that doesn't pay off very well.

Those are some basic things about the minimum quality standards. What I'm presenting here is fairly standard economic tools, but it makes the point in this simple example, and we can do this in real world examples, where there are all kinds of states of the world, good years, average years, bad years, and all sorts of things in between, we have sort of a set of conceptual tools that allow us to answer the question of whether or not the farmer would be better off or not, with or without insurance.

That's sort of the gloomy part of the presentation, and economics is sometimes called the dismal science, so that's the dismal part of the conversation. The question is, if we have this kind of standard, are there index insurance contracts out there, and what might they look like, that could meet this quality standard?

I'm just going to say a very few things so as not to go on too very much longer, but let me just, rather than stop just on the dismal quality standard, let me say just a few ideas about what happens.

I think it's important to stress that when we talk about contract failure or risk that's not insured by an index insurance contract, it's important to understand that uninsured risk is coming from two places. One of them is what's labeled on the slide idiosyncratic risk. Idiosyncratic risk occurs when the individual's losses differ from the losses experienced by those around her. Let's think of an insurance zone. An insurance zone is a group of farmers who are geographically proximate to each other, and they're all covered by the same kind of index. Tara showed us an example of what was happening in India, where farmers were insured by a rainfall measure, so all farmers within a given – and I think it was a

district level rainfall index in the case in India – all farmers got paid off or didn't get paid off based on the rainfall levels within that district.

So some farmers might have good years while other people have bad years. I noticed – I've seen several people sign in from West Africa. West Africa is famous for a lot of spatial variability, farmers who may only be a few kilometers from one another; some people get rain, because the rainfalls can be very concentrated spatially. Other farmers nearby get no rain and have a loss. And so within a small space, you can have highly idiosyncratic risk.

Idiosyncratic risk is never going to be covered well by index insurance, because at best, index insurance is going to cover farmers when – it's going to cover them for average losses within an insurance zone. There's a second sort of risk, and it's this second sort of risk that we can also address with good contract design. That second sort of risk is called here design risk, and design risk occurs when the insurance index is poorly correlated even with average losses in the insurance zone.

How do we make good contracts? The first is we can try to minimize design risk by having contracts, index contracts, that are well-correlated with farmer losses, and I would say a general rule of thumb is as we think about insurance indexes, we should have insurance indexes that are written on output, such as plant growth or yield, and not on the single input, rainfall.

So we've seen a lot of experimentation with rainfall-based index insurance, but notice, rainfall is just one of the many inputs that goes into determining whether or not a farmer has losses. So we need that.

In terms of designing the index insurance – excuse me, in terms of designing index insurance to minimize idiosyncratic risk, here, this is a very exciting kind of area where we can begin to take advantage of technological advances that allow us to measure – use remote sensing techniques to measure plant growth remotely, not only measure it remotely, but measure it at very, very high resolution.

In one of our current projects in the AMA Innovation Lab right now, we're working with three meter by three-meter resolution, remote sensing measures of plant growth. So that's extremely precise, meaning that we can in principle come up with a remotely sensed measure of plant growth on each and every farmer’s fields.

The second thing that I think can help minimize idiosyncratic risk is not only downscaling the contract, but also being very institutionally creative. We have a – maybe someone can put up a link we made to a little brief we wrote up called

Two Triggers are Better than One. And basically, what we've moved to, and this will be my last point here, I believe, is we're going to move to – we're moving towards having audit rules, so that we have a primary index that's highly reliable, and when that – when farmers indicate that those – even a reliable index will sometimes fail – then farmers can say, okay, your primary index failed. It said we had yields of only 70 percent of normal. The contract is supposed to trigger when yields are less than 60 percent of normal, and our yields were 50 percent of normal, so we want you to come in and investigate.

And that's something we're doing right now in a dual project in Tanzania and Mozambique both, where we have a reliable remote sensing-based primary index for the contract. This picture, which I won't try to explain, because it will take too long, shows that the primary index almost always works, but it fails every now and again. So in designing a contract, we've sort of embraced the probability that the contract will sometimes fail. Farmers, we've created a failsafe option, so farmers have a mechanism to register their complaints or disagreement with the index. We have an audit team that comes in and uses some fancy SEMIT-based ways of quickly estimating crop yields in farmers' fields. And then we've actually priced it into the insurance contract.

We worked with the insurance companies and we said, look, the index says payouts will happen this percentage of times, but we know from having collected data from farmers that every now and again, this high quality, high resolution index will fail. And so we've actually put into the price of the contract the payouts that have to be covered when the audit triggers it, not the primary index.

We think this is a nice example of a responsible contract that's not going to fail farmers any time in a fairly small locality of actually two villages, in this case. We've bundled them together into an insurance zone. Any time yields in those two villages are actually below the trigger value, farmers will get paid. That does not completely eliminate the idiosyncratic risk, but at least in these areas in Tanzania and Mozambique, these contracts are well worth the money for the farmer, even though there is a little bit of idiosyncratic risk that is not ensured.

So to close and move back to Tara for just a few more thoughts, we think getting these quality standards is really important. We think one of the challenges is thinking about how to work with private sector partners, such as insurance companies and public sector entities such as insurance regulatory authorities. How do we provide a quality assurance to the marketplace so that farmers can feel good about the insurance contract that they're offered, feel that they are protected, and that the industry then can invest in the extra effort that is required to create a high quality contract, and know that people will be willing to buy it because they recognize that indeed it is a worthy contract that they should take, that they can have confidence in and change their behavior and move up and

make those kinds of investments that Jen described to us earlier?

So let me pass it back to Tara, then, if we can.

Tara Chiu: Okay. Thank you, Michael, for that context. And I did want to say one of the slides Michael unfortunately had to skip did discuss many of these pricing issues for the audit rules that I see a lot of questions popping up about, so perhaps later we can revisit that.

What I wanted to build on what Michael said is building a quality contract is the first step in delivering a quality product to clients. I wanted to just briefly go over, in the interest of time, what the other pieces that are necessary – that need to be in place to make sure that index insurance interventions maximize their impact and, at a minimum, do no harm.

We've seen in some of our experiences that there are some weaknesses we consistently identify when insurance interventions, even if well designed, are poorly implemented or experience other implementation challenges. For example, a high quality contract may have diminished or absent benefits observed, not necessarily because of the potential of the product itself, but because of timing misalignment or any kind of other issues that I'll go into more later.

And because of this, farmers may have to resort to their traditional negative coping strategies, just because of a timing issue in delivering an otherwise good contract. This can also have credit market impacts, if late sales weaken the ability for farmers to make increased investment decisions and invest more in their land, in their productivity. Those impacts would not be observed, if it's sold too late. Also, if payouts are late, you can lead to things like, again, farmers resorting to negative costly coping mechanisms, even though insurance should have been there, and loan defaults, etcetera.

We also want to talk about, just briefly, these improvements in product design and intervention implementation should be kind of examined iteratively throughout the process, and as you learn more about the client, what the client needs, the value chain you're working in, etcetera, tweaks can be made to try to further improve the product such that it serves the client and has high value.

One thing that we – so the AMA Innovation Lab is collaboration with the ILO's impact insurance facility on a project called the Global Action Network to Advance Index Insurance. And as part of this collaboration, together with the support of EAA consultants, we've combined the minimum quality standards Michael has been talking about with an adaptation for agricultural insurance

loosely based on a _____ tool that the Impact Insurance Facility has put out. And through this, we've boiled down three categories, three different dimensions of value that we can observe, both before a product is in the field, during, and after. And these are all around design issues, distribution issues, and delivery issues.

And I know Sophie's putting a link in the chat box right now, so if you'd like to look at it further, I'm going to skip over it quickly in the interest of time, but I encourage you to take a look at that and let me know if you have any questions. But what this tool essentially does is by each indicator of these 14 different indicator across three dimensions, you can go through the specific criteria for each indicator and decide whether it is a poor score, meaning there's really bad shortcomings that need to be identified or addressed, average scores that meet some minimum standards, but really could do more to improve the client value, and strong, which means that you – this indicator fully meets the criteria, such that it has high potential to provide value to the client.

So as I said, when you use this tool before the start of an intervention, using this tool can give you an opportunity to identify potential fail points or potential challenges in the implementation prior to it happening. And so you might be able to avoid some loss of trust, loss of interest in your product, etcetera, if you use this tool before starting, almost as a checklist, to see what you have in place, and whether or not it will be sufficient.

During an intervention, if you're – especially if you're having challenges or consistent low demand or observing other challenges that you think might be inhibiting the impacts of your intervention, or the demand for your product, I think it's completely reasonable to do this as a self-assessment during an intervention to try to identify where improvements can be made.

And then before scaling to new areas, I think this needs to be done again to make sure that as you scale to new areas, the pieces that may have been in place fantastically in the pilot may need to be carefully analyzed to ensure that you're not losing quality as you're scaling up or intensifying in an area.

So overall, the key takeaways is that – that I want to just review, is that agricultural index insurance really is a promising tool with high potential for development impact, but careful planning of all these factors that we have discussed can really avoid some pitfalls that reduce product quality and that may actually do more harm than good. And it is essential to make sure that all of these pieces are in place for design, distribution, and delivery, prior to beginning an intervention, to maximize your investment and to maximize the benefits that you will see.

And with that, I'll pass it back to Julie for some question and answer.