

Weather Index Insurance Educational Tool (WIJET)
IRI EDUCATIONAL MODULE
Exercise: Updating an index using farmer information

Context: The goal of this exercise is to demonstrate how to adapt an initial weather index based on discussions with farmers.

Imagine that you are bringing an initial index to a new community. Discussions with the farmers will help you to determine if the index is useful for this new community and if it should be adjusted.

Note: This exercise uses hypothetical indexes and interviews for a hypothetical community. However, it is based on rainfall data, as well as modified versions of the indices and farmer discussions that have previously occurred in the HARITA project, in Ethiopia.

Weather Index Insurance Educational Tool (WIJET)

For this exercise we will be using the Weather Index Insurance Educational Tool (WIJET), pronounced “wheat”. This tool can be accessed at: <http://iri.columbia.edu/wiiet>. It is intended to teach the contract design process for index-based insurance contracts, by allowing the user to create a contract by working through a series of modules. In this way, the user is able to walk through the contract design process step by step: from the collection of crop and climate information to selecting the contract parameters; from tuning those contract parameters to eventually evaluating the contract’s performance. The end result is to have a contract that successfully models and hedges against the climate risk that farmers face in real-world conditions and that offers protection at a price, which is not prohibitively expensive.

Software note: Depending on your specific browser, sometimes you may need to reload the page or return to the main menu for datasets you have saved to be visible for selection in future activities.

In the following exercises we will primarily focus on creating and pricing contracts. In the *Create Contract* module, you can create a contract and apply it to a historical or simulated rainfall dataset to see what payouts would have occurred. The *Pricing* module allows you to calculate an insurance premium that is based on the payouts calculated in the Create Contract module. If you need further clarification at any point during this exercise, please refer to the *User Guide*, which can be found by clicking on the User Guide icon at the top right of any WIJET page.

Index Information: During the following exercises you will be working on creating an accurate index for a crop known as Teff. This crop is native to Ethiopia and similar to wheat.

At this point, you have had an initial discussion with the farmers in this new community and are using the computer web-tool, WIIET, to follow up on that discussion. This educational tool can help you develop a new index based on their responses.

After you have a new index, you will return to the farmers and discuss the strengths and weaknesses of your new index, and if they want to move forward with the insurance or not.

Additional background information:

1. Teff is the simplest index being offered in the project area. The index only focuses on the end of the rainfall season. Teff, in this area, is planted in the middle of the rainy season, when there has always been enough rain (according to the rainfall data and the farmers' memories). This crop is primarily vulnerable to lack of rainfall at the end of the season.
2. This exercise is focused on information provided by the farmers because it is the most important part of the process. Future exercises will use scientific analysis tools to further validate the indexes. These include crop water stress calculations, and statistical modeling of rainfall. It is possible to use advanced modeling to validate and improve these indexes. The indexes are designed to reflect the information in sophisticated models in a way that can also leverage information from farmers, and experts. They are also structured to be as easy to understand as possible.

The information for the pre-existing index is below. This is the information you will use as a starting point for your new index:

Initial Index Information:

Contract start: 11 August

Length: 70 days

Cap: 25

Dry Index Trigger: 82

Dry Index Exit: 60

Payout Years (Since 1995): 1995, 1997, 2000, 2004, 2008

Task 1: Bringing a pre-existing index to a nearby community

Now we are going to put this existing information into the computer.

Steps:

1. Log on to WIIET
2. Go to **Create Contract** module on the left hand side of the page
3. Click on **Example Satellite Precipitation** in the *Step 1* window on the left, to select that rainfall dataset
4. In the *Step 2* window it asks, "When would you like the contract to begin? Click on **Contract Start Dekad** and set the contract start dekad as: 11-Aug
5. *Length of Contract Period*: select 7 dekads

6. At the bottom of the *Step 2* box there is a matrix referring to *phases* covered. Click on the remove phase button until you have only **Phase 1**. Next, make sure each of the circles in that phase are blue by clicking on them.
7. Under *Step 3* you can set the *Dekadal Cap* to **25**
8. Set the Contract Failed Start Liability to **100**
9. On the bottom most table set the *Trigger* to **82**
10. Set the *Exit* to **60**
11. Set the *liability* for the phase to **100**
12. Set the *Maximum* liability to **100**
13. Now you are ready to **Run Simulation**: Click on the bottom right side of the page

Once you get results (a Payout Calculation graph and table), click on ‘**save parameters**’, in blue on the left hand side of the screen. Use the name: “**original**”, and description “**original index**”. Then click **save**. Then click **close**.

The graph and table you see on your screen are the results of applying the initial index to the new community. This shows us information such as what years would have paid out historically, if this pre-existing contract were used in this new community.

Questions:

1. What years would have paid out? _____
2. How many payouts would there have been? _____
3. Are there any years with full payouts? If Yes, how many? _____

Task 2: Adjusting the index based on farmer input from the new community

Now, imagine you have just returned from your trip to the new nearby community. Below are the notes you took from your discussion with the new farmers.

- › Dates; start/end: ___ 21 August
- › Length of desired insurance: 40 days
- › Bad years from farmers: 2000,2004,2006,2007,2009
- › Very bad years from farmers: 2000,2004,2009
- › Crops desired to be insured: ___ Teff_____

1. Compare the information that the farmers in the new community gave you to the results that the WIET tool generated. *Note that the difficult years described by the farmers do not completely agree with the existing contract that you designed.*

2. Next you will try to make a more appropriate index to fit the farmers’ needs. The below steps will help you make these adjustments. First, adjust the start date and length of insurance to try to better match the farmer’s concerns:

- To navigate back so that you can adjust the information you previously entered, click on “**view parameters**” at the top of the screen.
- Change the contract to reflect the **start** and **length** that the farmers have reported. This means reentering these two numbers, using the *new* information given above. Remember to translate the *length* given into dekads (10 day periods).
- Then, click on “**Run Simulation**” at the bottom.

Questions:

1. How many payouts would this community have experienced in the last 15 years if this new index had been used? _____
2. Is this a realistic index? _____
3. What else can be adjusted to create a better index that also addresses the farmers’ concerns? _____

Task 3: Making a More Appropriate Index

In this section you will adjust the trigger and exit until you have 5 payouts, one of which is a nearly full payout. This will be a complicated process and you will probably need several tries.

Hint: You may always switch between the “view parameters” screen and the “view results” screen by clicking on the gray bars at the top or bottom of the page. However, each time that you enter in new parameters you must hit the “run simulation” button in order to calculate your new index and historical payouts.

The goal is to try to have as many payout years agree with the farmers as possible. Try to have not too many very small payouts or very large payouts. However, both of these things are never possible to do perfectly.

Now it is time for you to adjust and play with the **exit** and **trigger** values. Once you have some results to be proposed, click on ‘**save parameters**’. Use the name: “*draft*”, and description “*draft index*”.

Questions:

1. What trigger value have you chosen? _____
2. What exit value have you chosen? _____

Hint:

Look at the “rain by phase” column of the output to decide what the trigger and exit should be. If the trigger is higher than the rain by phase for a particular year, that year will have a payout. If you want 5 payouts, you can find a trigger that has five years with the rain by phase less than that number. A full payout occurs when the exit is above the rain by phase. To have one year with a full payout, you can set the exit close to what the lowest rain by phase is out of all the years.

Task 4: Farmer discussion follow-up notes

(Complete the bolded tasks in the "Create Contract" module of WIJET)

Now that you have your improved adjusted index (from Task 3), you have returned to the community to present it to the farmers. During this discussion they tell you that they want an index that would have paid more money in years like 2009. It is important to explain to the farmers that this would probably lead to an index that costs much more, because all payouts would be much larger. The farmers should also be reminded that the future will be different from the past. The farmers understand your concerns, however, they are very confident that the expense is worthwhile if payments in years like 2009 could be increased.

In response, you must work with WIJET again and to **increase** payout sizes, without impacting the number of payouts. Return to adjust your parameters once again. Adjusting one single parameter can fulfill the farmers' request. Adjust and play with the parameter until you have an index that will satisfy the farmers.

Questions:

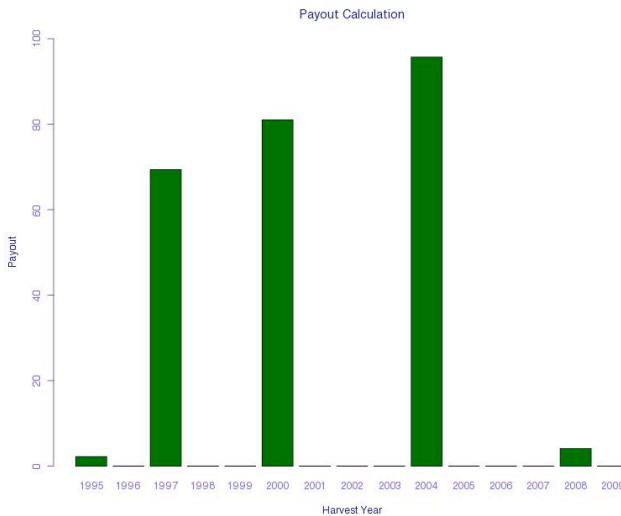
1. What parameter will you adjust to fulfill the farmers' request? _____
 2. Will this number be increased or decreased? _____
 3. Will this result in a more expensive index? Why or why not? _____
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Weather Index Insurance Educational Tool (WIET)
IRI EDUCATIONAL MODULE
Answer Key: Updating an index using farmer information

Task 1: Bringing a pre-existing index to a nearby community

1. What years would have paid out? 1995, 1997, 2000, 2004, 2008
2. How many payouts would there have been? 5
3. Are there any years with full payouts? If Yes, how many? No

Harvest Year	Total Payout
1995	2.241622727
1996	0
1997	69.39342682
1998	0
1999	0
2000	81.02607773
2001	0
2002	0
2003	0
2004	95.72336909
2005	0
2006	0
2007	0
2008	4.146644545
2009	0



Task 2: Adjusting the index based on farmer input from the new community

1. How many payouts would this community have experienced in the last 15 years if this new index had been used? Payouts in nearly all years
2. Is this a realistic index? Not really, as it would make the contract extremely expensive.
3. What else can be adjusted to create a better index that also addresses the farmers' concerns? Exit and Trigger

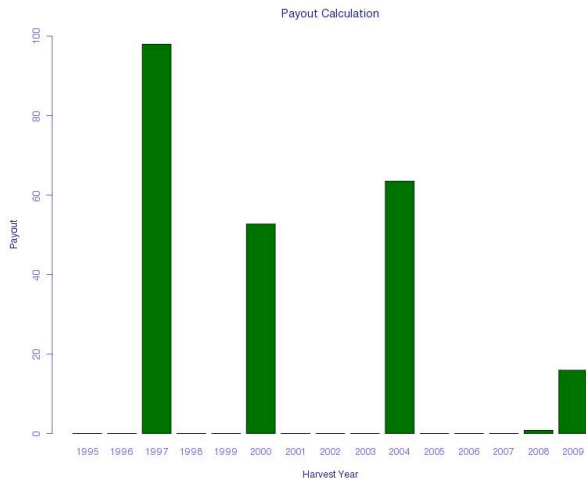
Task 3: Making a More Appropriate Index

(One suggested index)

1. What trigger value have you chosen? 55
2. What exit value have you chosen? 25

Results:

Year	Sow Dekad	Rainfall for Phase 1	Payout for Phase 1	Total Payout
1995	24	56.51	0	0
1996	24	67.32	0	0
1997	24	25.6	98	98
1998	24	76.06	0	0
1999	24	55.24	0	0
2000	24	39.17	52.75	52.75
2001	24	64.97	0	0
2002	24	64.85	0	0
2003	24	82.73	0	0
2004	24	35.94	63.53	63.53
2005	24	63.23	0	0
2006	24	58.32	0	0
2007	24	57.06	0	0
2008	24	54.75	0.83	0.83
2009	24	50.21	15.97	15.97



Payout years:
1997, 2000, 2004, 2008, 2009

Discussion:

This index meets many of our design goals. It does not have too many large payments (which would increase the price), and it pays out in the very bad years mentioned by farmers. For most of the very bad years, there is a large payout, except for 2009, which would have had a relatively small payout.

It has a few limitations that will need to be discussed with farmers. It does not provide a payout in 2006, which was mentioned by farmers as a bad year. It also provides payouts in 1997 and 2008, which were not mentioned as drought years.

To remind you of the farmer discussions:

Bad years from farmers: 2000,2004,2006,2007,2009

Very bad years: 2000,2004,2009

Often, years very far in the past will not be on the farmer’s minds during design discussions, so it is valuable to use the discussion more to focus on evaluation of what more recent payouts would have been.

From our rainfall data, 1997 is a very bad year. In discussions with experts, 1997 was a year with very low rainfall, so it is likely that it was actually a bad year, and we believe that would be a worthwhile payout.

The primary concern is that 2006 would not have had a payout. We need to follow up in the next farmer discussion to see if this year was really that bad, and also if it would be acceptable to have a product that would not have paid out in 2006. Typically, the index cannot be made perfectly. The farmer design team must feel comfortable about the amount of mismatch in the contract in order to proceed with implementation.

Task 4: Farmer discussion follow-up notes

1. What parameter will you adjust to fulfill the farmers' request? Exit
2. Will this number be increased or decreased? Increase
3. Will this result in a more expensive index? Why or why not? Yes, more expensive. A full payout occurs when the exit is above the rain by phase. To have one year with a full payout, you can set the exit close to what the lowest rain by phase is out of all the years. When the exit is raised there will be more payouts making the index more expensive.

The payouts for the index resulting from this process is presented in the figure below:

