iFEED extremes – yield shocks calibrated statements summary

OVERVIEW

Definitions and background: a yield shock occurs when yield is below 1.5 standard deviations from the baseline mean value (across 21 years). Yield shocks have been assessed for maize, soybean, potato and groundnut. The potato and maize shock thresholds are typically around 1000 kg/ha (with average baseline yields around 2000 kg/ha), and soybean and groundnut thresholds are typically less than 500 kg/ha (with average baseline yields typically at or below around 800 kg/ha), reflecting mean yield differences between the crops in the baseline. For all thresholds used, and more details on these simulations, see the Appendix in the full crop yield shock document.

Unless otherwise stated, statements apply to all four of these crops. All projections are for 2040 to 2060 and all stated changes in yield shock rates are relative to the baseline period of 1990 to 2010. All values of increases in shock rates are averages across climate models. The most useful information is therefore the direction of travel (increase vs decrease), and relative comparison across crops.

LT = low tech / ineffective markets / ineffective policy / low land reform scenarios in Tanzania, Zambia, Malawi and South Africa respectively.

Note that the most common confidence assessment is used as the basis of the summary confidence assessments here. In the event of a tie in confidence, expert judgement is used to decide the confidence level.

RESULTS:

Current crop yield shocks for all AFRICAP countries:
Baseline yield shock rates in all four AFRICAP countries are such that in a ten-year period, there is ~50% probability of one or more yield shocks occurring. Medium confidence.

MALAWI

Low climate risk / LT:
A downward trend in yields, coupled with increasing yield variability in the case of soybean and potato, result in approximately double the number of years of yield shock. Soybean shows signs of being more resilient to extreme weather, with fewer shocks than the other three crops. Medium Confidence.

High climate risk / LT:
A downward trend in yields, coupled with increasing yield variability in the case of soybean and potato, contributes to an increase of approximately 2-3 times the number of years of yield shock for maize and groundnut and ~6 times more yield shocks for potato. Soybean yields do not show a downward trend and show an increase of only 0-1 times more yield shocks. Medium Confidence.

Low climate risk / HT:
Effectively implemented irrigation and crop varietal improvements across the country result in significantly reduced yield shocks. Medium Confidence.

High climate risk / HT:
Effectively implemented irrigation and crop varietal improvements across the country result in significantly reduced yield shocks. Medium Confidence.

TANZANIA

Low climate risk / LT:
A downward trend in yields contributes to the ~50% increase in the number of years of yield shocks in maize and groundnut. Soybean shows signs of being more resilient to extreme weather, with only a small increase in yield shocks, and potato shows a much higher shock rate due to low baseline yield shocks and increasing variability. Medium Confidence.

High climate risk / LT:
A downward trend in yields, coupled with increasing yield variability in the case of potato, contributes to, approximately, a doubling in the number of years of yield shocks for maize and groundnut and ~6 times more shocks for potato. Soybean yields show a smaller increase in shocks (30%, on average). Medium Confidence.

Low climate risk / HT:
Effectively implemented irrigation and crop varietal improvements across the country result in significantly reduced yield shock rates. Medium Confidence.

High climate risk / HT:
Effectively implemented irrigation and crop varietal improvements across the country result in significantly reduced yield shock rates. Medium Confidence.

ZAMBIA

Low climate risk / LT:
A downward trend in yields (and for potato and soybean, increased variability) contributes to an ~50% increase in the number of years of yield shock in maize and soybean. Groundnut shows signs of being less resilient to extreme weather, with an approximate doubling of yield shocks, and potato shows an approximately 3 times increase in yield shock rate. Medium Confidence.

High climate risk / LT:
A downward trend in yields (and for potato, increased variability) contributes to an increase of ~40% in years with maize yield shocks, ~3 times increase for groundnut and ~6 times more yield shocks for potato. Soybean yields show little change in yield shock. Note that yield shock increases are lower in this scenario compared to the low

climate risk scenario, as irrigation is increased for the high climate risk scenario. Medium Confidence.

Low climate risk / HT:
Effectively implemented irrigation and crop varietal improvements across the country result in significantly reduced yield shock rates. Medium Confidence.

High climate risk / HT:
Effectively implemented irrigation and crop varietal improvements across the country result in significantly reduced yield shock rates. Medium Confidence.

SOUTH AFRICA

Note that all results for South Africa assume a yield technology trend due to improved varieties and practises over time – as has happened from 1961 to 2010, according to FAOSTAT observations. When not assuming a continuation of these improvements, yield shocks would increase.

Low climate risk / LT:
Yield shock rates remain similar to the baseline period due to the applied technology trend to yields. If not assuming this technology trend increase to mean yields, yield shocks typically increase. Medium Confidence.

High climate risk / LT:
Yield shock rates largely decrease due to the applied technology trend to yields and irrigation. If not assuming this technology trend increase to mean yields, and with no benefits from irrigation in future, yield shocks typically increase. Medium Confidence.

Low climate risk / HT:
Yield shock rates remain similar to the baseline period due to the applied technology trend to yields. If not assuming this technology trend increase to mean yields, yield shocks typically increase. Medium Confidence.

High / climate risk HT:
Yield shock rates largely decrease due to the applied technology trend to yields and irrigation. If not assuming this technology trend increase to mean yields, and with no benefits from irrigation in future, yield shocks typically increase. Medium Confidence.