Signaling the start of season: the influence of climate change on maize planting dates evidence from Zambia

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Signaling the start of season: the influence of climate change on maize planting dates

PRESENTER:
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MOTIVATION

- In rain-fed agricultural systems, extreme weather events and shifts in weather patterns can dramatically **reduce agricultural productivity** (Kotir, 2011).
- Small farmers often have **limited adaptive capacity**; their responses to changes in climate are often constrained to **low-cost agricultural management strategies.**
- Hypothetical simulations have shown that choosing an **optimal planting date**, based on weather conditions, has the potential to significantly **increase maize yields** (Baum et al., 2020).

QUESTIONS

1. How do historical and current weather conditions influence a farmer's decisions on when to plant maize?
2. What is the effect of the **start of season rainfall** date on maize yields for small-scale farmers?

METHODS

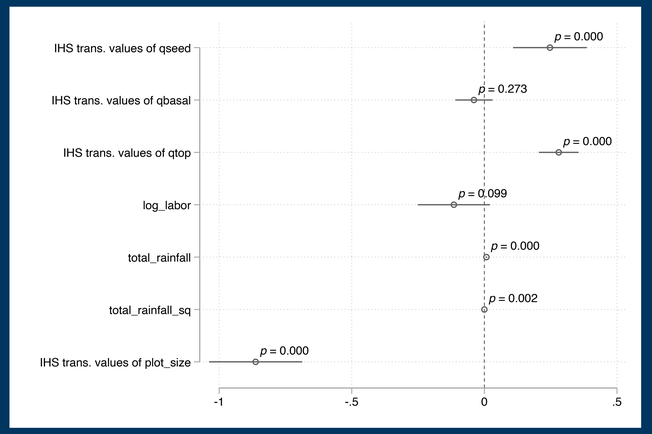
We estimate a Cobb Douglas production function with camp level fixed effects.

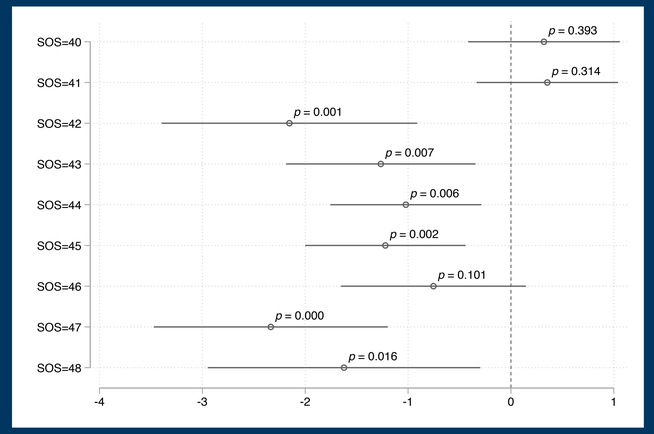
$$Y_{ict} = \sum_{j=0}^{J} \beta_i \log(I_{ict}) + \gamma_1 rainfall_{ict} + \gamma_2 rainfall_{ict}^2 + \sum_{j=0}^{J} \beta_j SOS_{ict} + \delta_c + \theta_t + \epsilon\_ict$$

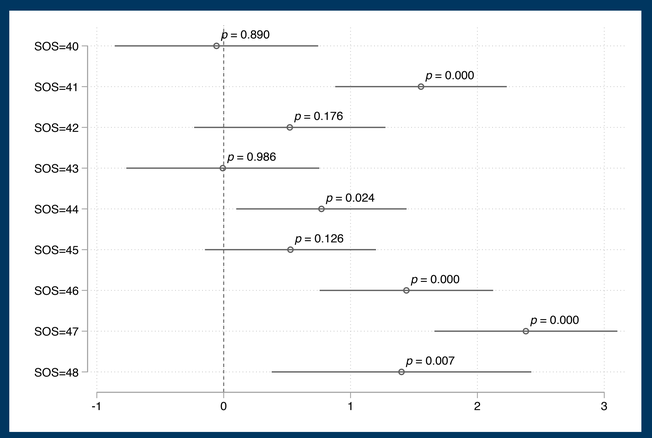
We exploit the exogenous variation, planting dates across space (camps), and use a standards fixed effects model:

$$PD_{it} = \sum_{j=0}^{J} \beta_j SOS_{it} + \delta_i + \theta_t + \varepsilon_{ict}$$

"**Late season rainfall** is associated with **later** planting dates and **decreased maize yields**"







RESULTS

Figure 1A and 1B plot results from Equation 1.
Figure 2 plots results from Equation 2.
Together these results imply late season rainfall is associated with later planting dates and decreased maize yields

DISCUSSION

Rainfall variability and climate change are predicted to continue and intensify over the next century. Thus, it is important for both policy and research purposes to understand how changes in weather are affecting farmer decisions, and how these decisions are affecting yields.

Take a picture to **download** the **full paper**

***These are preliminary results and are subject to change before AAEA Annual Meetings

DATA

Household Income, Consumption, and Production Survey (HICPS)

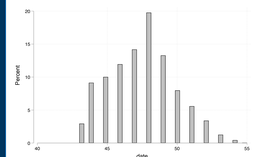
4-year panel approximately 1200 respondents. Includes information on:

- Household socioeconomic demographics
- Individual plot level data by maize planting:
  - Harvest Quantity
  - Plot size
  - Seed choice
  - Inputs
  - Planting dates

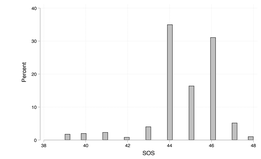
Climate Hazards Infrared Precipitation Data with Stations (CHIRPS)
We extract the data using 100 km buffers around each household
Constructed a variable that indicates the start of season rainfall (SOS)

SOS definition: 25 mm of precipitation within 10 days, followed by 2 ten-day periods with cumulative 20mm precipitation.

When do farmers plant ?



When does the rain start?



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