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# Drought and the Food Retail Sector

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**Motivation:** In agriculture-dependent settings, droughts cause a food supply shock that affects how local food markets function.

**Research Question:** How does drought affect revenue, employment, entry and exit of food retail firms in rural markets?

**Methods**: I use publicly available micro-data from 6,000 firms in 157 markets spread across four counties in Kenya collected annually from 2013-2017 (McKenzie and Puerto, 2017). I use and difference-in-differences specification to exploit spatial and temporal variation in drought intensity to identify the effect of drought on retail outcomes.

## RESULTS

- Firms in drought-affected markets have lower revenue and profits, and have fewer workers.
- Woman-owned firms are more likely to exit drought-affected markets, yet other new firms are *more likely* to enter those same markets.
- The number of competitors increases by over one-third
- Food retailers do not have significantly worse outcomes, although most crowding-in appears to be in cereal sellers.

Results suggest that new firms crowd into markets and existing firms hold onto their firms despite worse outcomes

## DATA

- Panel of 3,558 women's-owned firms from 6 surveys administered from 2013-2017. These firms participated in a business training RCT funded by the ILO/World Bank.

- Panel of 157 markets in 4 counties with information on entry and exit in 3 surveys from 2014-2017.

- Repeat cross-section of other firms in the same market (including sector, revenue, and employment) from 3 surveys from 2014-2017

- Drought data come from Palmer Drought Severity Index (PDSI), .5x.5 degree grid cells, matched to survey month

## SETTING
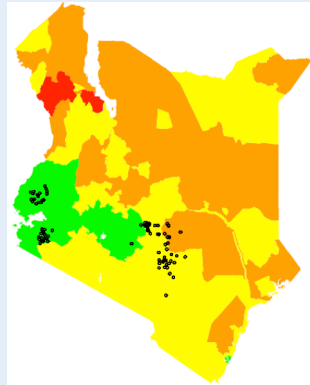
**FEWS Food Insecurity Classification**
1. Green – Minimal/None
2. Yellow – Stressed
3. Orange – Crisis
4. Red – Emergency

## CONCEPTUAL FRAMEWORK

Droughts affect total household consumption by lowering potential revenue earned through sale of crops in output markets (Dercon, 2002). In the absence of insurance and credit markets, households sell assets or engage in temporary income generating strategies to cope with the negative productivity shock (Hoddinott, 2006; Carter and Lybbert, 2012; Janzen and Carter, 2018).

Rural food markets must reconcile a negative supply shock with a demand shock that might be positive (if household purchase more from markets) or negative (if, despite selling assets, household are in a worse financial position).

## RESULTS

Table 1: Effect of Drought on All Firms

| | (1) Sales per Week | (2) Profit per Week | (3) Workers per Week | (4) Number of Competitors |
|---|---|---|---|---|
| post ×drought | -1821.79*** | -431.38*** | -0.14** | 3.71*** |
| | (555.12) | (138.44) | (0.05) | (1.09) |
| Control Mean | 7303.47 | 1818.61 | 0.42 | 10.00 |
| Obs | 20533 | 20458 | 20848 | 20654 |
| Adj R-Squared | 0.05 | 0.07 | 0.09 | 0.31 |

Standard errors in parentheses
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 2: Effect of Drought on Cereals Sellers

| | (1) Sales per Week | (2) Profit per Week | (3) Workers per Week | (4) Number of Competitors |
|---|---|---|---|---|
| Post | -3038.35*** | -996.84*** | -0.43*** | 3.26** |
| | (761.38) | (165.24) | (0.07) | (1.61) |
| Drought ×Post | -2087.11*** | -431.14*** | -0.13** | 3.20** |
| | (591.83) | (142.52) | (0.06) | (1.23) |
| Cereals Sector | 3357.90*** | 159.20** | -0.18*** | -3.04*** |
| | (411.30) | (70.43) | (0.02) | (0.99) |
| Drought ×CerealsSector | 188.77 | 59.33 | 0.09*** | -0.33 |
| | (729.18) | (123.89) | (0.03) | (1.48) |
| Post ×CerealsSector | 1402.48* | 276.77** | 0.04 | 1.56* |
| | (800.72) | (135.63) | (0.04) | (0.89) |
| Drought ×post × CerealsSector | 439.10 | -54.69 | -0.01 | 3.01*** |
| | (1145.41) | (206.81) | (0.06) | (1.21) |
| Control Mean | 7303.47 | 1818.61 | 0.42 | 10.00 |
| Obs | 20510 | 20436 | 20826 | 20631 |
| Adj R-Squared | 0.07 | 0.07 | 0.10 | 0.32 |

Standard errors in parentheses
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

## SPECIFICATION

Differences in Differences:

$$Y_{imt} = \alpha + \beta Drought_m \times Post_t + \gamma_1 Drought_m + \gamma_2 Post_t + \epsilon_{imt}$$

Triple Differences:

$$Y_{imt} = \alpha + \beta Drought_m \times Post_t \times FoodSector_i + \gamma_1 Drought_m + \gamma_2 Post_t$$
$$+ \gamma_3 FoodSector_i + \delta_1 Drought_m \times FoodSector_i + \delta_2 Drought_m \times Post_t$$
$$+ \delta_3 Post_t \times FoodSector_i + \epsilon_{imt}$$

- Where $Y_{imt}$ are outcomes for firm i, in market m, at time t
- Beta identifies the effect on firm i of being in a market where drought occurred (assuming parallel trends assumption holds).

## NEXT STEPS

- Despite not experiencing drought directly, other counties could be affected by drought if they sell crops to drought-affected areas. To check this, I can run event-study regressions in drought and non-drought areas to verify whether non-drought markets experience direct effects from the drought.
- In-kind food distribution in drought-affected markets could contribute to the drop in revenue/profits. So far, no evidence suggests that in-kind food distribution was widespread in the drought-affected markets *in these data.* (Food distribution is widely reported in Northern Kenya).