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# Does expansion of midstream activities benefit smallholder farmers? Evidence from Zambia

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## Overview

- The ongoing changing dietary patterns and associated food systems transformation promises to create opportunities for farmers
- The opportunities are driven by increases in demand for agro produce as inputs for fast-expanding processing firms in midstream of food value chains
- The extent to which these opportunities are inclusive and beneficial to smallholder farmers is uncertain
- Studies looking at the effects of participation in modern value chains have often done so through the lens of contract farming
- However, welfare impacts may be different in the absence of contracts.
- This paper contributes to the literature with evidence from Zambia on how non-contract-based participation in the soybean value chain impacts smallholder welfare

## Objectives

This paper answers the following questions:

- Does selling soybean output to large-scale buyers improve farmers incomes, poverty and food security?
- Are there differential impacts for small-scale smallholders (less than 5ha) and medium-scale smallholders (5-20ha)
- Do large-scale buyers offer higher prices or purchase more output?

## Contributions

- First to explore welfare effects of the rapid expansion of non-contract opportunities in the midstream of commodity value chains in Africa.
- Second, this paper contributes to the thin empirical evidence on whether the ongoing expansion of commercialization opportunities due to Africa's changing dietary patterns benefits small scale farmers.

## Data

- Data comes from the Zambian Rural and Agricultural Livelihoods Survey (RALS).
- The RALS covers 8,839 households tracked from 2012 to 2019 in three waves. Second wave occurs in 2015.
- Data is nationally representative

**Figure 1.** Distribution of sale outlet

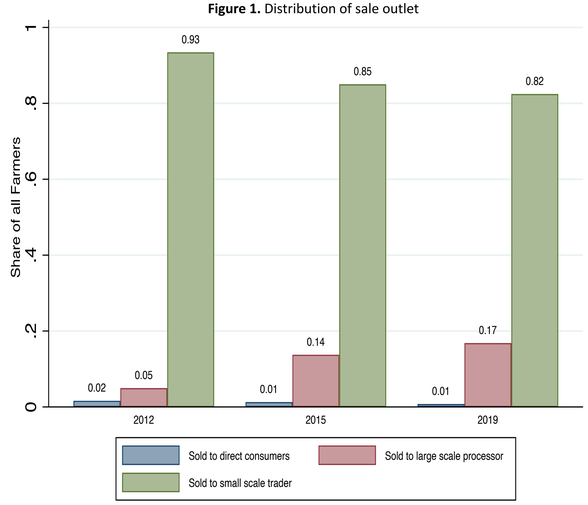
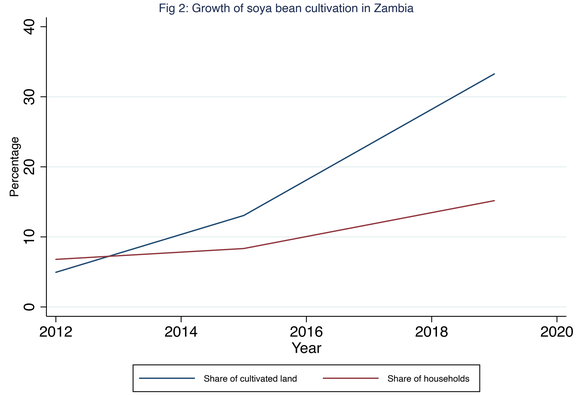



Fig 2: Growth of soya bean cultivation in Zambia




## Estimation Strategy

We estimate:

$$y_{ti} = \alpha_0 + \beta_1 S_{it} + \beta_2 X_{it} + \gamma_i + \delta_t + \varepsilon_{it}$$

where $y_{ti}$ is the welfare outcome of interest of household $i$ in time $t$. $S_{it}$ is a dummy equal to 1 if household $i$ sold soybean output to large buyer in time $t$. $X_{it}$ is a vector of household covariates, $\gamma_i$ is the household fixed effect and $\delta_{it}$ is the time fixed effect while $\varepsilon_{it}$ is the idiosyncratic error term.

## Instrumental Variables Approach

- Identification relies on $E(\varepsilon_{it}, S_{it} | X_{it}, \gamma_i, \delta_t) = 0$
- Doesn't hold if there are time varying unobservables at household level
- Instrument: Share of other households (excl $i$) in district $d$, engaged in soybean production= $\omega_{dt}$
- Relevance condition: $E(S_{it}, \omega_{dt}) \neq 0$. Large buyers are attracted to areas where they can get large surpluses to buy. Production is fractionally distributed among smallholder farmers. Hence, large buyers are attracted to areas where many smallholder farmers are engaged in soybean production
- Exclusion restriction: $E(\varepsilon_{it}, \omega_{dt} | X_{it}, \gamma_i, \delta_t)$=0. Thus, $\omega_{dt}$ affects $y_{it}$ only through $S_{it}$. Reverse causality is extremely implausible.
- Summary: Two-way FE and 2SLS-FE

## First Stage Estimates

| VARIABLES | Sold to large buyer | Sold to Small buyer | Sold to large buyer | Sold to Small buyer |
|---|---|---|---|---|
| Share of other households producing soybean | 0.449*** | -0.518*** | 0.456*** | -0.481*** |
| | (0.033) | (0.035) | (0.034) | (0.035) |
| F-Stat | 14.62*** | 16.64*** | 13.68*** | 14.52*** |
| Household level controls | Y | Y | Y | Y |
| District level controls | Y | Y | Y | Y |
| Household fixed effects | Y | Y | Y | Y |
| Year fixed effects | Y | Y | Y | Y |
| Observations | 22,313 | 22,313 | 9,922 | 9,922 |

Cluster robust standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1

## Results

| | FE Estimates | | | 2SLS-FE Estimates | | |
|---|---|---|---|---|---|---|
| | All | Small | Medium | All | Small | Medium |
| Crop Income | 0.807*** | 0.767*** | 0.524 | 3.339*** | 4.963*** | 1.504*** |
| | (0.182) | (0.276) | (0.330) | (0.552) | (0.919) | (0.481) |
| Total Income | 0.118** | 0.088 | 0.086 | 0.562*** | 0.932*** | 0.390* |
| | (0.055) | (0.080) | (0.101) | (0.172) | (0.262) | (0.236) |
| Income poor (0/1) | -0.035 | -0.043 | -0.092** | -0.036 | 0.045 | -0.388*** |
| | (0.023) | (0.032) | (0.040) | (0.078) | (0.113) | (0.137) |
| Poverty gap | -0.030** | -0.009 | -0.041** | -0.109* | 0.057 | -0.109 |
| | (0.014) | (0.021) | (0.019) | (0.056) | (0.087) | (0.068) |
| Poverty severity | -0.029** | -0.011 | -0.024* | -0.141*** | 0.025 | -0.043 |
| | (0.012) | (0.018) | (0.014) | (0.051) | (0.081) | (0.055) |
| Number of months food insecure | -0.053 | -0.042 | -0.058 | 0.596 | 0.985 | 0.010 |
| | (0.114) | (0.188) | (0.195) | (0.378) | (0.647) | (0.341) |
| Household FE | Y | Y | Y | Y | Y | Y |
| Year FE | Y | Y | Y | Y | Y | Y |
| Observations | 22,313 | 18,658 | 3,655 | 22,313 | 18,658 | 3,655 |

Cluster robust standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.

## Conclusions

- We study the effects of selling soybean output to large buyers on smallholder welfare in Zambia
- We use both two-way FE and 2SLS-FE to account for unobservables
- We find positive income effects of selling to large buyers for all farmers
- We find poverty-reducing effects only for medium-scale smallholders (5-20ha) but not small-scale smallholders (below 5ha)
- Effects are driven by opportunity to sell
- We do not find significant differences between the price offered by small-scale buyers and those of large-scale buyers
- Results suggest that smallholders may be benefiting from value chains expansion

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