

# Linkages between processing firms and small-scale farmers: Opportunities for upgrading in Tanzanian cashew nuts



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## Introduction Research questions Materials & Methods

**Agriculture:** dominant economic activity and employment generator in Tanzania. But poverty and food insecurity are still widespread in small subsistence farms. Cashew nuts: cash crop and key source of foreign currency and the mainstay of many rural livelihoods. But they are still exported in raw form. Higher value addition could benefit rural communities and stimulate the agro-processing industry.

**Contract farming (CF):** vertical integration between small-scale farmers (SSFs) and processing firms. Our sample: only agreements on prices and quantities. Review studies document positive effects on income (Bellemare & Bloem, 2018; Ton et al., 2018; Wang et al., 2014). Fewer studies document improvements in food security (Bellemare & Lim,

2018; Bellemare & Novak, 2017; Mishra et al., 2018; Soullier & Moustier, 2018). Lack of studies of CF in Tanzania and about the cashew nuts sector (Danso-Abbeam et al., 2022; Dubbert, 2019; Miassi & Dossa, 2019).

- **RQ1:** Does contract farming increase SSFs welfare (output and food security)?
- **RQ2:** What are the mediation channels of CF effects in SSFs welfare?
- **RQ3:** What are the market and policy constraints holding back processing firms in the Tanzanian cashew nuts sector?

**Qualitative** methods to study the firms' side.

**Primary data** collected in early 2022 in 3 regions in Tanzania with farmers (345), firms (12), and policy stakeholders (23).

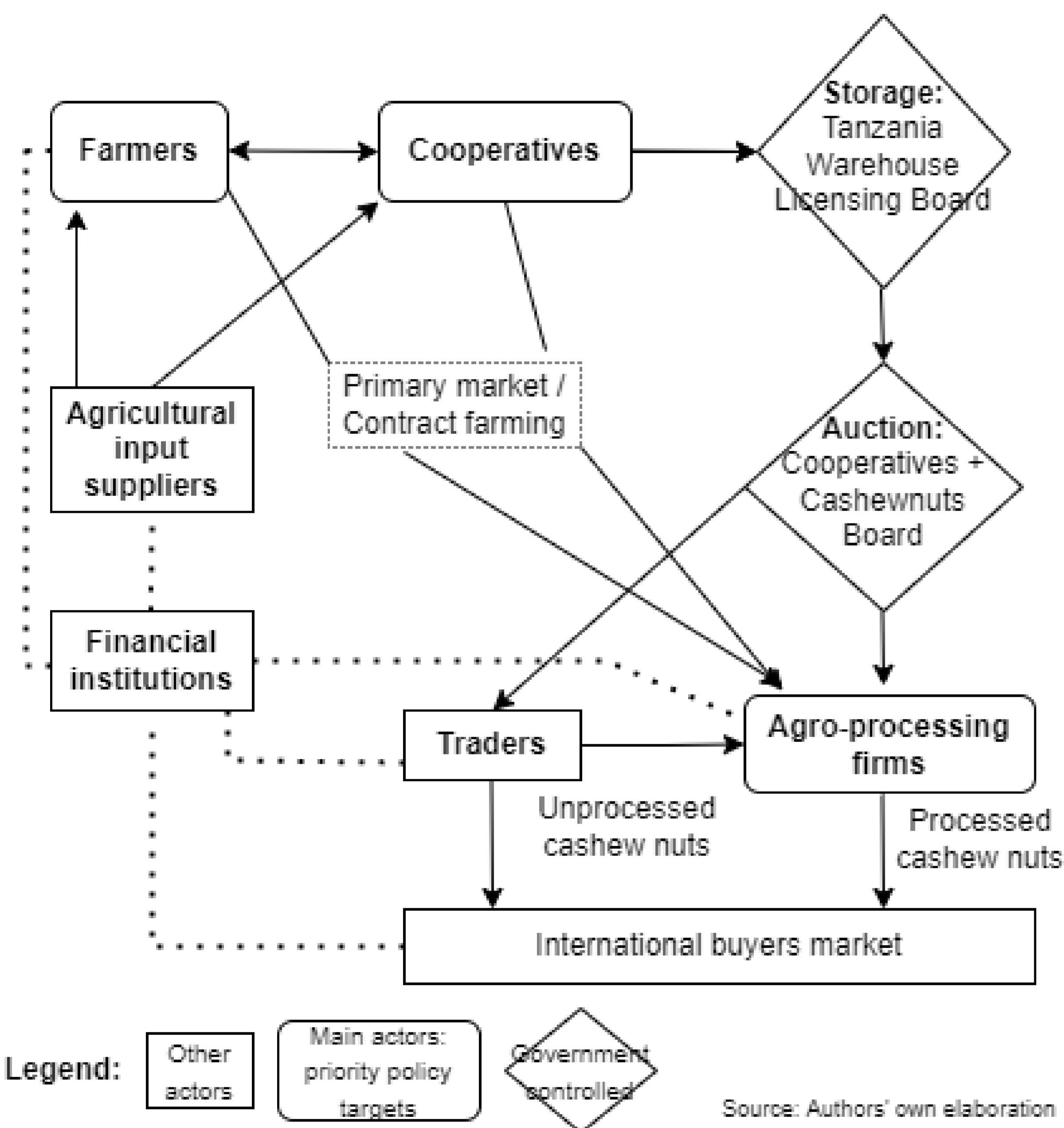
**Variable of interest – CF** -> Dummy: 0, SSFs sell produce via government-run auctions; 1, SSFs engage with processors via CF agreements.

**Endogeneities:** Households self-select into CF based on their preferences and socioeconomic traits.

**Selection on observables:** Propensity score matching (PSM) and inverse probability-weighted regression adjustment (IPWRA) estimate the average treatment effects (ATE) and on the treated (ATT).

**Selection on unobservables:** Instrumental variables approach. CF instrumented by distance to the nearest CF farmer and the number of CF farmers in a certain radius. IVs pass all tests and are exogenous: no plausible pathway in which IVs determine neither the outcomes, nor the controls.

## Conceptual Framework Results



**Empirical specification** ->  $Y_i = \beta_0 + \beta_1 CF_i + \beta_2 X'_i + \varepsilon_k$

**Estimation methodology:**

- Selection on observables: Propensity score matching + Inverse probability weighting regression adjustment.
- Selection on unobservables: Instrumental variables 2SLS -> IVs: distance to nearest CF farmer + number of CF farmers in a 10-25-100-200 Km radius: pass all tests.

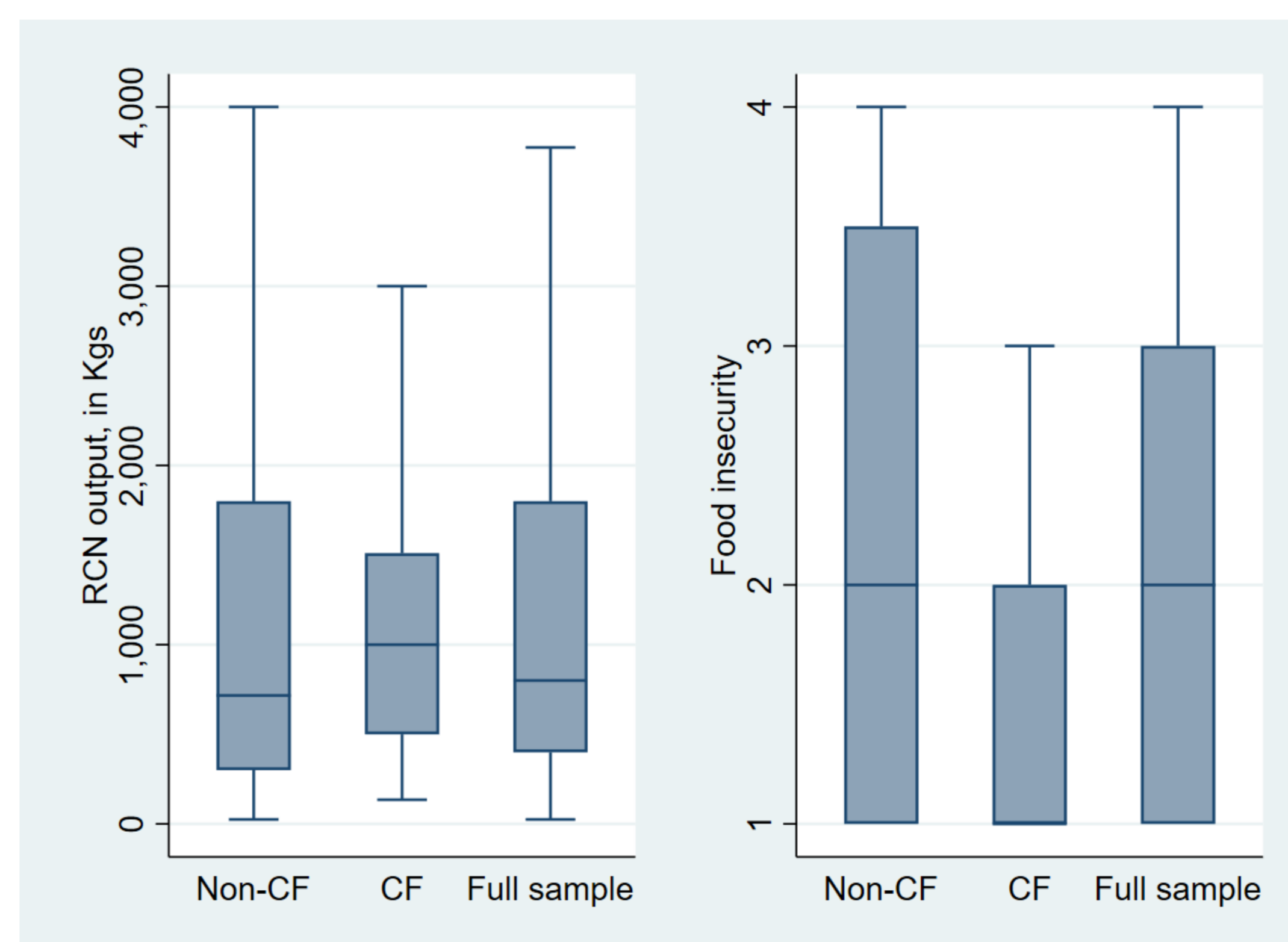
## Conclusions

- Contract farming in the Tanzanian cashew nuts sector is associated with larger cashew nuts output and lower food insecurity -> **CF has positive welfare effects**. Fits into empirical literature.
- **Processors** need more **support** from the **government to increase value addition**: expensive credit, deficient infrastructure, poor access to export markets.

**Table 4** Summary effects of contract farming on outcome variables

	(1) OLS	(2) PSM-ATT	(3) IPWRA-ATE	(4) IPWRA-ATT	(5) IV
Cashew nuts output	260.86** (121.20)	312.47* (176.23)	241.62** (111.05)	352.06*** (115.45)	199.07* (132.23)
Food insecurity (HFIAS)	-0.600*** (0.117)	-0.657*** (0.119)	-0.568*** (0.108)	-0.636*** (0.123)	-0.544*** (0.138)
Household controls	YES	YES	YES	YES	YES
Agronomic controls	YES	YES	YES	YES	YES
Observations	345	345	345	345	345

Standard errors clustered at the village level in parentheses: \*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ .



- **Sampling strategy:** list from cooperatives -> 345 households -> stratification at village level and by CF.
- CF impacts are larger for participants (ATT) than for the full sample (ATE).
- **Results robust** in PSM and IPWRA estimations.
- IV point estimates < OLS benchmark -> Evidence of **downward bias**.

- **Mediation channels: Price** -> CF farmers receive higher prices and prefer contracts over auctions to reduce risk. **Marketing** -> few options of CF schemes and lack of reliable buyers outside of auction system. Engaging with CF reduces marketing risk.
- 70% of processing firms invest or plan to invest in machinery; 85% use manual or semi-automatic machinery, which are mostly second-hand -> blocks productivity growth.

