

Contract Farming and Production Constraints: Evidence from a Field Experiment in Benin

A. Aminou, J.C. Lokossou, and J.D. Michler

5th International Rice Congress
Singapore, 16 October 2018

Background

- In SSA, smallholder rice production is characterized by:
 - Low input use
 - Low productivity
 - Substantial price uncertainty
- Results in production primarily for home consumption, lack of integration into markets, and low incomes
- Contract farming is a mechanism that can be designed to address risks/constraints faced by farmers resulting in rural transformation

Research Question

- Can we design farming contracts that ease production constraints and help insulate producers from risks?
- Methodology
 - Work with rice miller to develop different types of contracts
 - Conduct randomized control trial (RCT) where farmers are randomly assigned to one of three contracts
 - Measure treatment effects using Simple Mean Difference, Difference-in-Differences, and household Fixed Effects
- The objective is to quantify the impact of different contract characteristics on smallholder production and various measures of rural transformation

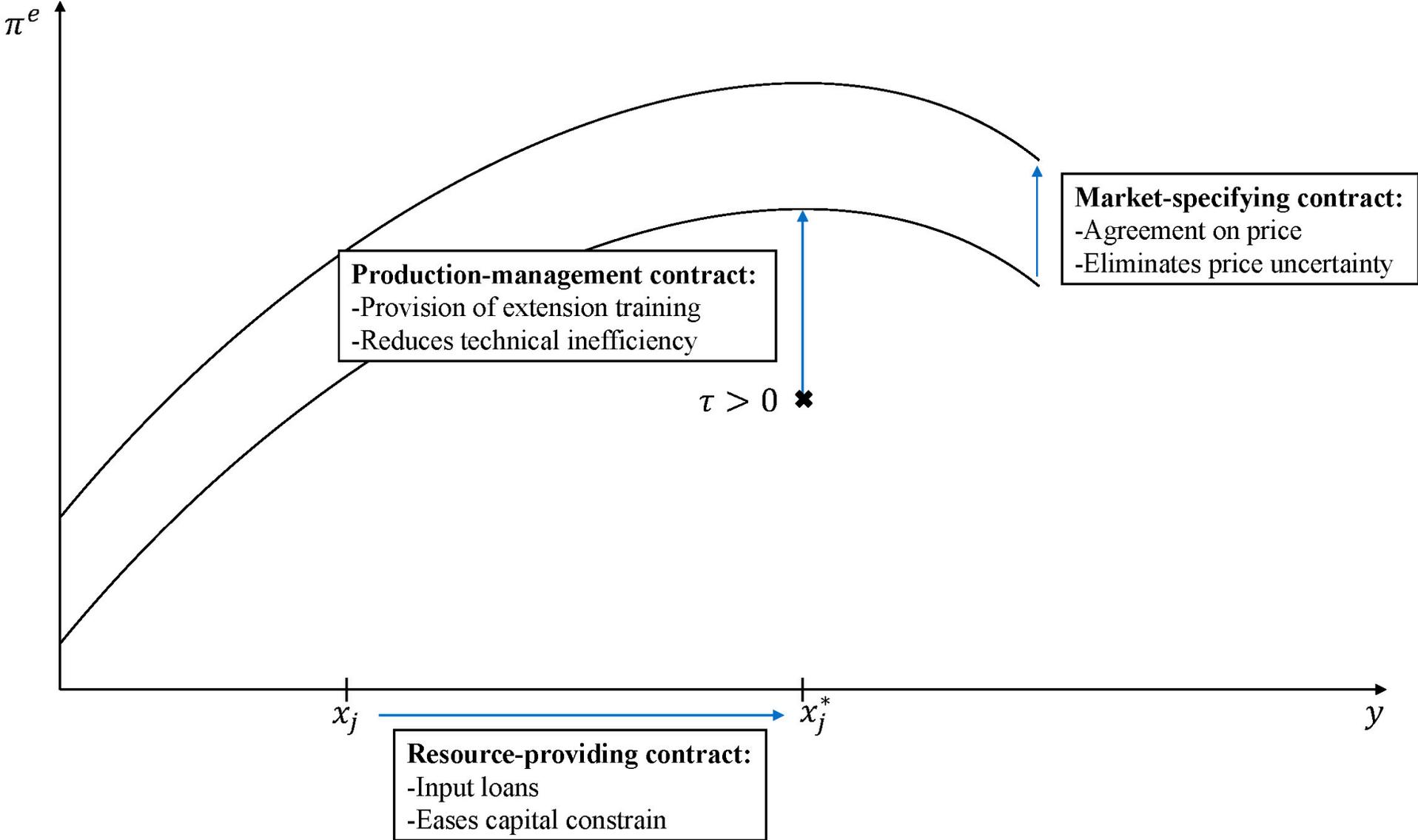
Contribution to the Literature

- Empirical evidence on the impacts of contract farming is mixed
- Positive impacts on household welfare
 - Barrett et al., 2012; Bellemare, 2010; Kirsten and Satorius, 2002; Reardon et al., 2009
- Mixed, negative or no impacts
 - Singh, 2002; Guo et al., 2005; Soullier and Moustier, 2018
- Recent reviews of the literature by Bellemare (2018) and Bellemare and Bloem (2018) have stressed the need for better research methods
- This paper is the first to use a randomized control trial to explore the impacts of contract farming on smallholder farmers

Theoretical Model

- Develop a model of agricultural production with:
 - Stochastic production
 - Technical inefficiency
 - Output price risk
 - Capital constraint on input purchases
- Develop three different types of contracts following Mighell and Jones (1963)
 - Market-specifying contract (guaranteed price)
 - Production-management contract (extension training)
 - Resource-providing contract (input loans)

Expected Impacts of Contracts



Experimental Design

- We randomized farmers into either 1 of 3 types of contracts or into a control group
 - C: control farmers with no agreement
 - T1: miller provides an agreement on sale price and quantity
 - T2: miller provides an agreement on sale price and quantity, plus technical training
 - T3: miller provides an agreement on sale price and quantity, plus input loans and technical training
- Outcomes of interest are 4 rural transformation indicators: farm size, productivity, market participation, and income

Data and Empirical Method

- Baseline data was collected in 2015
 - Targeted farmers who had grown rice in the previous year and who expressed interest in growing rice in 2016
 - Data collected prior to random assignment
- Prior to 2016 growing season, farmers randomly assigned into one of the 4 groups
- End-line data was collected at harvest
- Econometric method
 - Simple Mean Difference (SMD), Difference-in-Differences (DiD) and household Fixed Effects (FE)

Treatment Effect of Price Guarantee [T1-C]

	SMD	DID	FE
<i>Farm size (ha)</i>	0.038 (0.095)	0.219* (0.113)	0.212* (0.113)
<i>Productivity (kg/ha)</i>	456.8*** (164.8)	451.1 (321.8)	435.2 (311.7)
<i>Market participation (%)</i>	20.008*** (2.879)	29.258*** (5.413)	29.080*** (5.300)
<i>Rice income (USD\$/ha)</i>	422.8*** (153.1)	538.7*** (123.8)	532.3*** (119.4)

Treatment Effect of Extension Training [T2-T1]

	SMD	DID	FE
<i>Farm size (ha)</i>	-0.104*	-0.554**	-0.553**
	(0.056)	(0.233)	(0.230)
<i>Productivity (kg/ha)</i>	-83.4	-272.9	-273.8
	(110.4)	(369.6)	(364.1)
<i>Market participation (%)</i>	9.114***	-13.94*	-13.95*
	(2.125)	(7.975)	(7.873)
<i>Rice income (USD\$/ha)</i>	29.23	-77.70	-79.64
	(89.46)	(139.5)	(137.8)

Treatment Effect of Input Loans [T3-T2]

	SMD	DID	FE
<i>Farm size (ha)</i>	0.129*** (0.039)	0.453* (0.237)	0.452* (0.234)
<i>Productivity (kg/ha)</i>	159.2** (79.1)	285.9 (298.9)	280.1 (295.3)
<i>Market participation (%)</i>	10.85*** (1.634)	11.35 (9.250)	11.10 (9.119)
<i>Rice income (USD\$/ha)</i>	504.0*** (72.2)	515.5*** (107.7)	515.7*** (107.1)

Treatment Effect of Training and Loans [T3-T1]

	SMD	DID	FE
<i>Farm size (ha)</i>	0.025 (0.048)	-0.101 (0.141)	-0.101 (0.140)
<i>Productivity (kg/ha)</i>	114.86 (108.93)	12.95 (345.12)	7.81 (339.95)
<i>Market participation (%)</i>	16.894*** (2.060)	-2.576 (7.585)	-2.677 (7.478)
<i>Rice income (USD\$/ha)</i>	552.62*** (101.22)	437.91*** (143.55)	434.88*** (142.47)

Treatment Effect of All Three [T3-C]

	SMD	DID	FE
<i>Farm size (ha)</i>	0.279*** (0.088)	0.118 (0.125)	0.117 (0.123)
<i>Productivity (kg/ha)</i>	513.5*** (169.8)	464.6* (237.4)	457.4* (232.5)
<i>Market participation (%)</i>	38.78*** (2.773)	26.67*** (7.177)	26.50*** (7.023)
<i>Rice income (USD\$/ha)</i>	1,045*** (123.74)	976.3*** (86.77)	974.2*** (86.03)

Summary of Results

- Price guarantee – increases farm size, market participation, rice income
- Extension training – does not add anything to the price guarantee and may reduce outcomes
- Input loans – increases farm size and rice income relative to price guarantee
- Extension training + input loans – only increases rice income
- Price guarantee + extension training + input loans – increases productivity, market participation, and rice income

Conclusion

- Farm contracts can contribute to rural transformation
- Contracts providing all three elements generated the largest gains for farmers relative to the control
- However, simply providing insulating farmers from price risk (through guaranteed price contract) generated surprisingly strong impacts
- Future research should continue to explore what are the binding constraints to rural transformation