

# **Improving trust and reciprocity in agricultural input markets: A lab-in-the-field experiment in Bangladesh**

**Alan de Brauw and Berber Kramer\***

Markets, Trade and Institutions Division  
International Food Policy Research Institute (IFPRI)

**Symposium on Economic Experiments  
in Developing Countries (SEEDEC)**

May 30, 2019, Chou Hall, University of California, Berkeley

# Motivation: Poor functioning of agricultural input markets

For smallholder farmers, high-quality agricultural inputs are important to enhance productivity, but there are potential challenges in input markets:

- Inputs are **experience goods**: Quality can be observed only after use
- Low adoption if **trust** in retailers to sell high input quality is limited
- Input markets could turn into a **market for 'lemons'**

Empirically, we also observe poor quality control, sometimes even counterfeiting (Bold *et al.* 2017, Ashour *et al.*, 2018)

- Even in the context of competition and repeated interactions
- Reputation for quality: Insufficient to generate high-quality equilibria?

## Stress on quality agricultural inputs for farmers

UNB



Speakers at a function here on Thursday underscored the need for ensuring quality seed, fertilizers, insecticides and other agricultural inputs to the farmers to boost production of crops and get fair prices against the varieties, reports UNB.

In this context, the agricultural inputs producers, businessmen, and providers would have to be sincere and honest in supplying and selling seed, fertilizers, insecticides and other inputs to the farmers so that the growers are not cheated by them in case of producing crops, they opined.

# Overview of this study

**Lab-in-the-field experiment** with 720 input **retailers** and smallholder **farmers** in Bangladesh

- Huck, Lünser and Tyran (2016): Competition on price (in addition to quality) lowers efficiency in markets for experience goods
- Price competition increases complexity of marketplace, leading consumers to pay too little attention to reputation for quality
- This reduces demand for efficiency-enhancing yet more expensive high-quality products

## Objectives of the experiment:

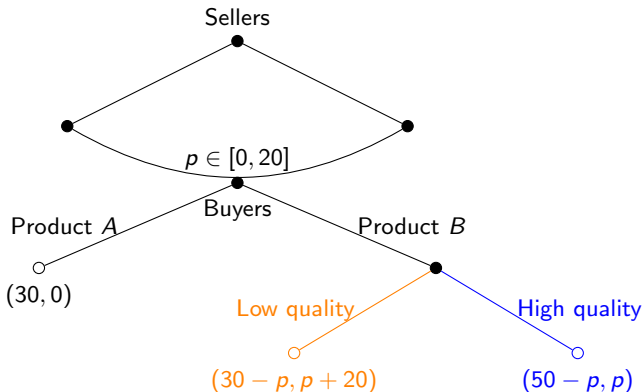
- 1 Study markets with price competition and reputation formation using modified trust game with price competition
- 2 Analyze, within these markets, the impacts of a more buyer-oriented and quality-focused distribution channel

# 1. Model current input markets as a trust game

**Competitive input markets with repeated interactions (seasons)**

# 1. Model current input markets as a trust game

## Competitive input markets with repeated interactions (seasons)



# Predictions for experiment with 10 rounds (seasons)

**Self-interested sellers and buyers: low-price low-quality equilibrium**

# Predictions for experiment with 10 rounds (seasons)

**Self-interested sellers and buyers: low-price low-quality equilibrium**

**Buyer trust and seller reciprocity could change outcomes:**

- Last round: Seller  $i$  may reciprocate purchase of  $B_i$  at  $p_i > 0$  by providing high quality
- Buyers may purchase  $B_i$  even if  $p_i > 0$  if seller  $i$  is trustworthy
- Repeated interactions allow sellers to build a trustworthy reputation

**Q1: What do we observe empirically?**

- To what extent do buyers pay attention to reputation for quality?



## 2. Effects of buyer-oriented input marketing strategy

Interventions within a market systems development initiative:

- Identification of preferred retailers based on buyer reviews ('likes')
  - ▶ Accreditation: Publicly announce highest-rated seller ('preferred retailer')
- Discounts on high-quality product for (clients of) preferred retailers
  - ▶ Direct rewards: 'Preferred retailer' receives 5 Taka reward per **high-quality** product sold
  - ▶ Indirect rewards: Buyers receive 5 Taka reward when purchasing **high-quality** product from 'preferred retailer'

**Q2: (How) do these interventions improve market outcomes?**

- Do buyers pay more attention to reputation for quality?

# Procedures

Treatment randomized by session (40 sessions in total, 10 per treatment!)

- Per session 3 'markets' with 2 retailers and 4 buyers (farmers)
- Real payment after every round, total earnings 3.3x daily wage

## Overview of a round

- 1 Sellers make price and quality offer (yellow = low, blue = high)
- 2 Buyers choose seller and product, knowing price but not quality
- 3 Beliefs elicitation (buyers: quality; sellers: competitor behavior)
- 4 Provide feedback, real payment and buyer reviews





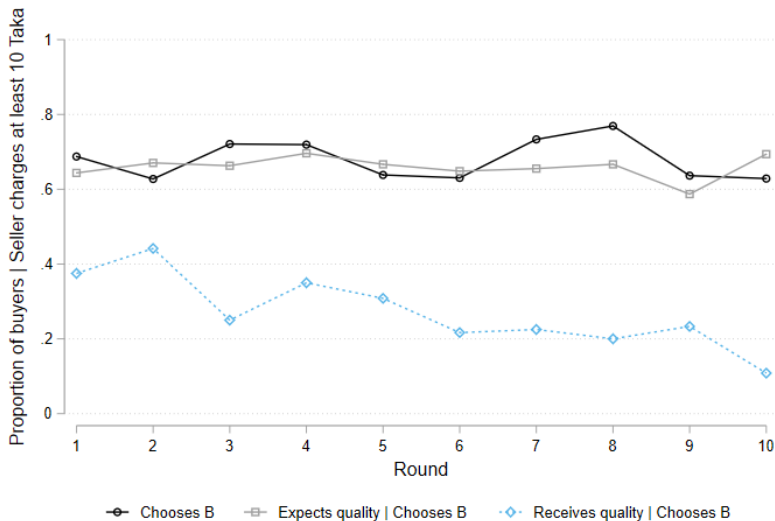
# Description of sample

## Input sellers: More educated, wealthier, better understanding

	Farmers	Input sellers	<i>p</i> -value
Participant age	43.9	43.4	0.560
Participant is female	0.021	0.000	0.025
Participant is literate	0.526	0.953	0.000
Years of education	4.0	9.2	0.000
Food expenditures (Taka '100s)	1,395	1,745	0.001
Average level of understanding	0.797	0.903	0.000
Understanding accreditation	0.649	0.798	0.000
Understanding rewards	0.665	0.792	0.000
Standardized Raven's test score	-0.18	0.35	0.000
Number of observations	480	240	

# RESULTS I: CONTROL MARKETS

# Prices, trust and reciprocity in **control** group



## Behavior in **control group** by level of understanding

	Dependent variable: Chooses Product B			
	(1)	(2)	(3)	(4)
Minimum price (prop. of 20 Taka)	-0.313*** (0.035)	-0.304*** (0.086)	-0.326*** (0.033)	-0.324*** (0.088)
Expects a seller offers high quality	-0.021 (0.134)	-0.089*** (0.024)		
Received high quality last round			0.039** (0.015)	-0.003 (0.029)
Above-median understanding	0.027 (0.022)	-0.089* (0.043)	0.026 (0.021)	0.002 (0.021)
... X Minimum price (prop. of 20 Taka)		-0.016 (0.145)		0.010 (0.153)
... X Expects a seller offers high quality		0.140** (0.043)		
... X Received high quality last round				0.078* (0.038)
Mean dependent variable	0.916	0.916	0.916	0.916
Number of observations	882	882	882	882
R-squared	0.069	0.077	0.072	0.076

Model estimated using OLS.  $p$ -values in parentheses clustered by session. \*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

# Overview of findings

## **Market with observed prices, asymmetric information about quality**

- ➊ Retailers charge high prices for Product B but provide low quality
- ➋ High demand despite existence of outside option (Product A)
- ➌ Particurly so among farmers with lower levels of understanding

**Less 'savvy' farmers pay too little attention to reputation for quality**



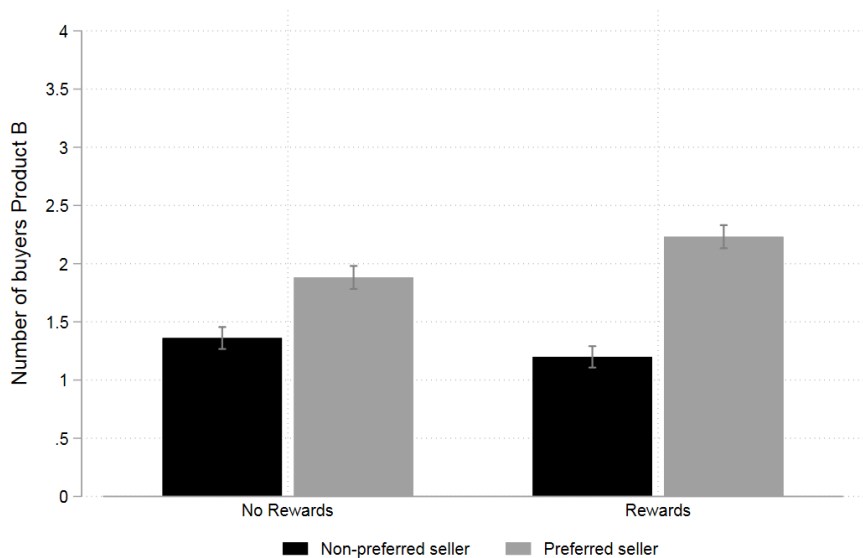
# RESULTS II: TREATMENTS

**Table:** Average treatment effects on seller and buyer behavior

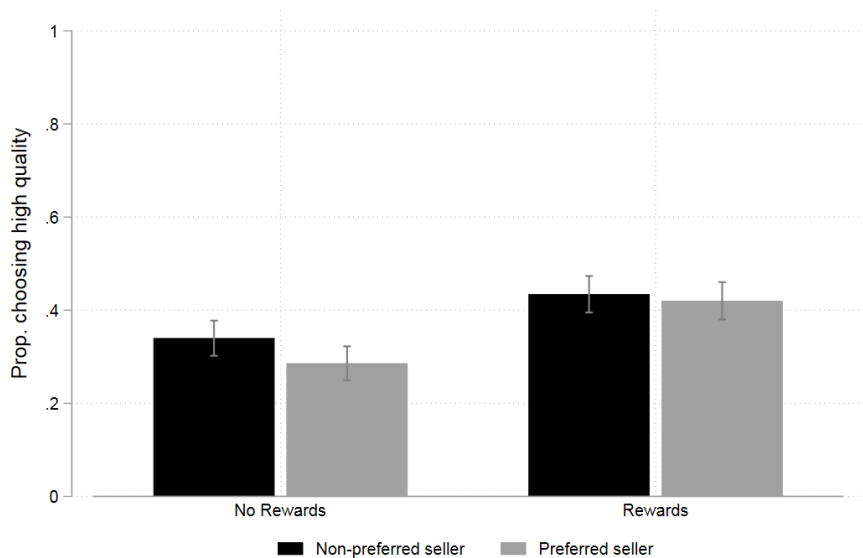
	Seller behavior				Buyer behavior			
	Price (prop. max price)		Provides high quality		Purchases Product B		Repeat purchase (if B last round)	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Rewards	0.068 (0.154)	0.067 <sup>†</sup> (0.062)	0.114* (0.022)	0.113** (0.000)	0.040 (0.316)	0.019 (0.544)	0.081** (0.000)	0.078** (0.002)
Controls		✓		✓		✓		✓
$R^2$	0.017	0.152	0.046	0.093	0.004	0.080	0.011	0.024
$N$	2160	2160	2160	2160	4320	4320	3588	3588
Mean	0.421	0.421	0.350	0.350	0.830	0.830	0.568	0.568

*Notes:* Model estimated using linear least squares, controlling (in all columns) for round fixed effects and (in even columns only) the following characteristics: order in session, order of cluster, session order within cluster, Ravens score and dummy variable indicating that Ravens score is missing, understanding of the baseline game, talked to earlier participant and dummy variable indicating a missing, above-median understanding, above-median connected with farmers in the session. In Columns (2) and (4), we also control for a dummy variable indicating that the seller is denoted as "Seller S1". First-round observations have been excluded.  $p$ -values shown in parentheses are based on a wild bootstrap clustered at the session level. No significant differences between control and accreditation, and between direct and indirect rewards. <sup>†</sup>  $p < 0.10$ , \*  $p < 0.05$ , \*\*  $p < 0.01$

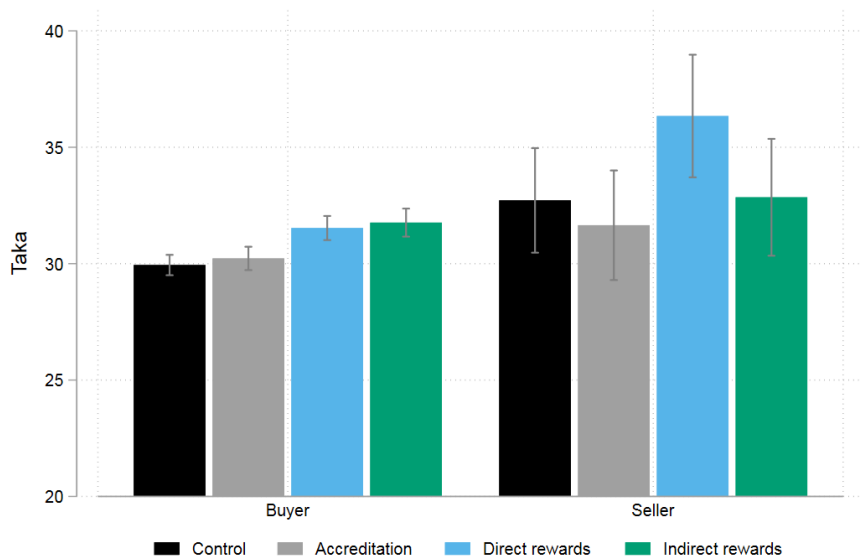
# Demand by treatment and preferred status



## Quality by treatment and preferred status



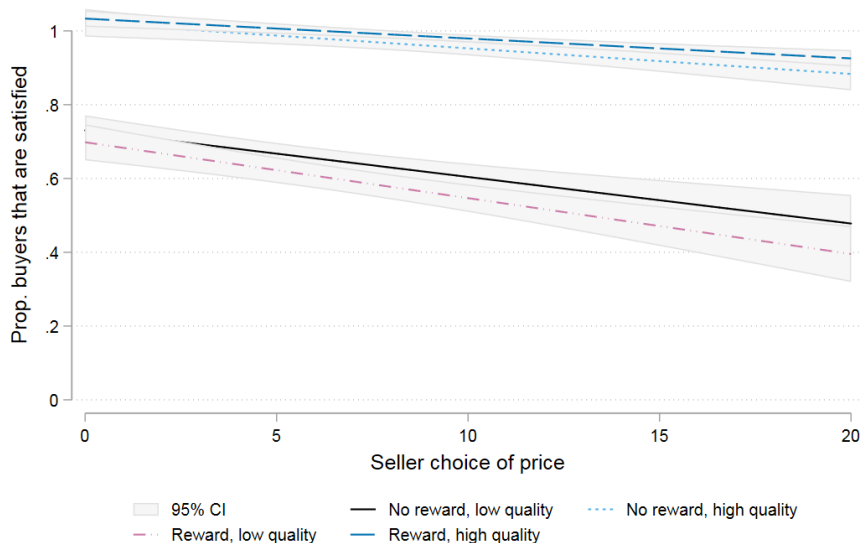
# Payoff by treatment



# Overview of findings

- ① **Market with observed prices, asymmetric information about quality**
  - ▶ Less 'savvy' farmers pay limited attention to reputation for quality
- ② **Rewards for 'preferred' retailers selling high quality (or their buyers)**
  - ▶ Higher quality and more repeat purchases, but sellers gain more than farmers
- ③ **Heterogeneity for preferred versus non-preferred sellers**
  - ▶ Preferred retailers attract buyers from competitors (increased trust)
  - ▶ But they do not necessarily reciprocate / provide high quality
  - ▶ Farmer earnings improve less than seller earnings

# What determines buyer ratings?



# Conclusion

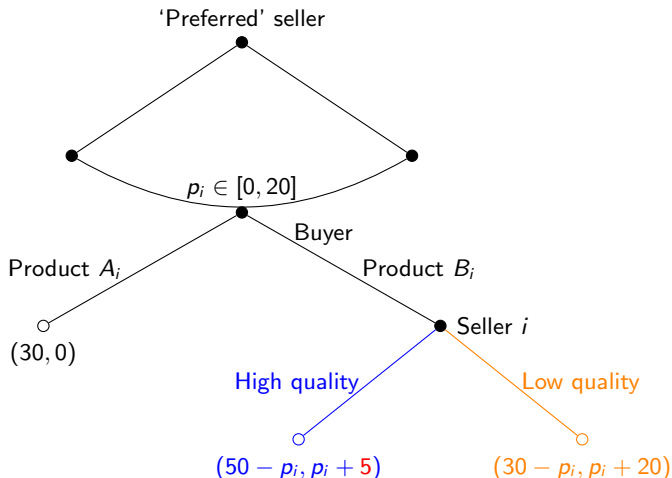
- ❶ **Market with observed prices, asymmetric information about quality**
  - ▶ Less 'savvy' farmers pay limited attention to reputation for quality
- ❷ **Rewards for 'preferred' retailers selling high quality (or their buyers)**
  - ▶ Higher quality and more repeat purchases, but sellers gain more than farmers
- ❸ **Accreditation fails as quality signal due to noise in farmer ratings**
  - ▶ Small incentives can be effective in improving market outcomes
  - ▶ Insufficient to increase farmers' attention to quality signals



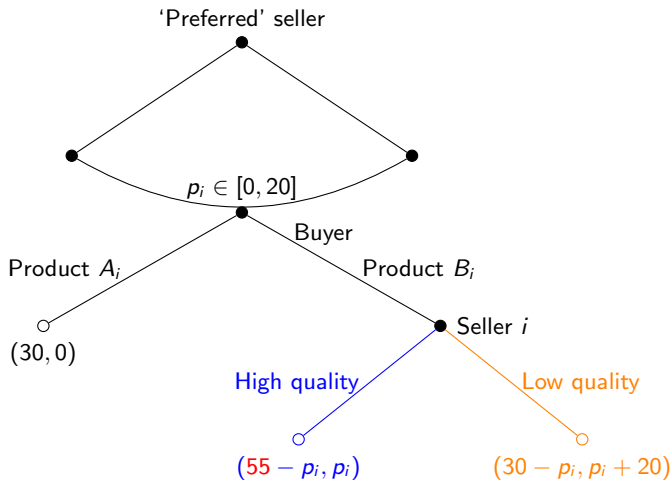
**THANK YOU!**

**B.Kramer@cgiar.org**

# Binary trust game with direct rewards



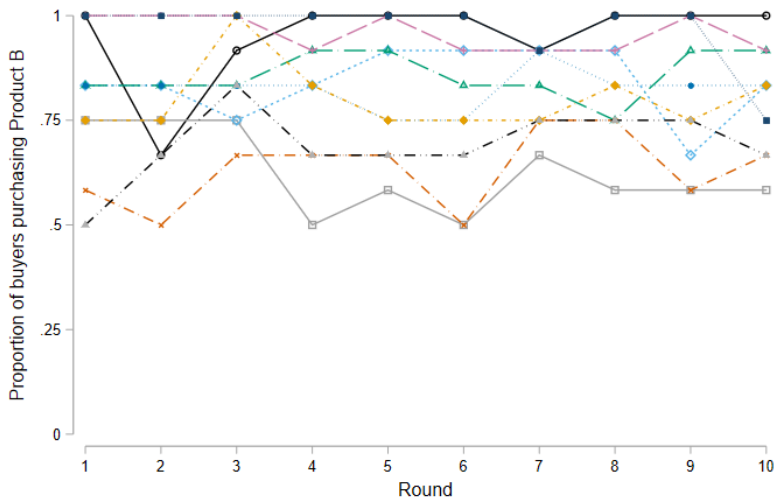
# Binary trust game with indirect rewards



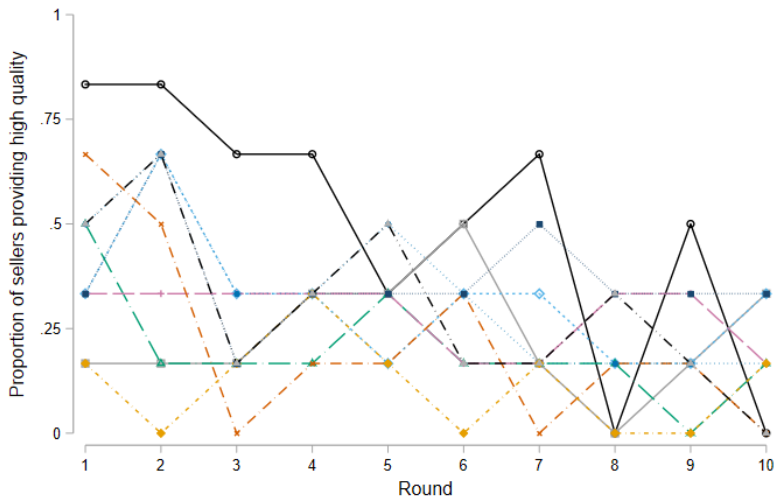
# Relations with input sellers

- Median farmer knows 3 sellers of the full seller sample by sight, so there is competition
- About 70 percent started buying from their most recent input seller at least five years ago
- This is not related to the provision of credit: only 28 percent buys from the seller on credit
- Most buyers choose to purchase inputs from the seller in their village

# Demand for efficient product in **control** group



# Supply of high-quality product **control group**

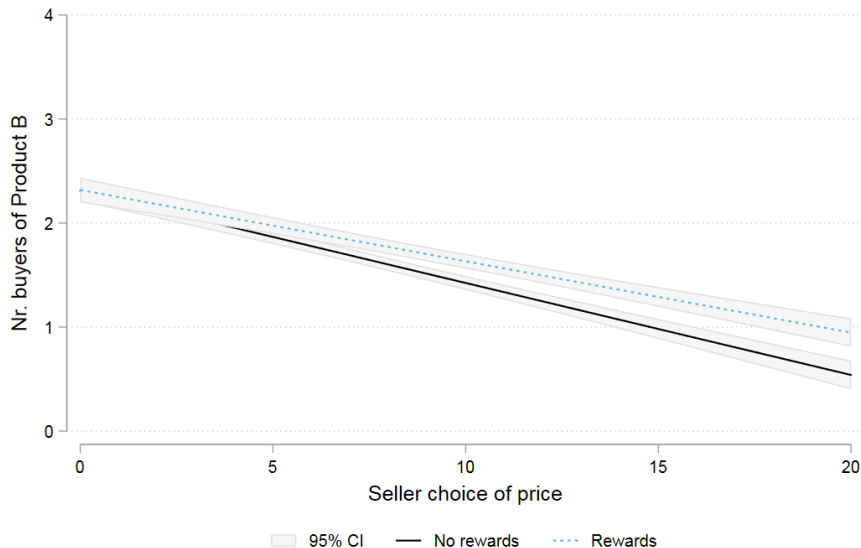


## Outcomes for sellers in control markets

	Market share		Total profit	
	(1)	(2)	(3)	(4)
Price difference with other seller	-0.405*** (0.046)	-0.408*** (0.043)	-0.149*** (0.022)	-0.151*** (0.023)
Offers high quality	0.010 (0.044)	0.009 (0.042)	-0.155*** (0.018)	-0.154*** (0.018)
Offered high quality in last round	0.066* (0.031)	0.064* (0.029)	0.033* (0.015)	0.033* (0.015)
Prop. buyers with good understanding	-0.053 (0.047)	-0.074 (0.076)	-0.002 (0.016)	-0.029 (0.043)
... X Price difference		0.366*** (0.112)		0.147** (0.063)
... X Offers high quality		-0.160 (0.165)		-0.032 (0.068)
... X Offered high quality in last round		0.208 (0.178)		0.110 (0.094)
Number of observations	540	540	540	540
Number of sessions	10	10	10	10
R-squared	0.226	0.243	0.289	0.300
Mean dependent variable	0.408	0.408	0.207	0.207

Model estimated using OLS.  $p$ -values in parentheses clustered by session. \*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

# Rewards and demand curve





# Quality by retailer status and quality last round

