

Interlinked transactions in credit-output markets in Indian agriculture

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Outline of the presentation

- Background
- Review of Literature
- Research Question
- Data
- Summary Statistics
- Model
- Results
- Conclusion

Background

- Farmers receive low prices
- Doubling farmers income (2022)
- Not all farmers receive the same, low prices, some more than others
- Several reasons have been proposed: quality, bargaining power

Interlinked Markets: theory

- Interlinked markets: two or more interdependent exchanges are simultaneously agreed upon.
- Resolves information asymmetry and uncertainty
- Saves transaction and contract enforcement costs
- Minimize the potential risk of default
- Interlinked markets exists not due to imperfections in the product market but due to imperfections in credit market
- Leads to exploitation of farmers: lower output price
- Input dealer, not trader who may be the focal point

Research question

- Do farmers who borrow from the informal sector, sell back to them at a lower price-implicit interests rates manifest as price discounts?

Data

- Nationally representative sample of agricultural households (70th round NSSO, 33 schedule), covers 35200 households
- Two visits: visit 1 (Kharif) and visit 2 (Rabi)
- Amount outstanding as on date of survey (visit1)
- Production and Marketing of 4 principal crops
- Transaction level data: sale upto three unique channels
- Marketing channel wise volume transacted and prices are recorded
- District level infrastructure: census 2011 village amenities data

Sources of credit

Borrowing sources	Percentage taken from these sources	Average amount of loan outstanding	Source of credit	Percentage
Government	2.32	88858.98	Formal	21.64
Cooperative	12.59	77223.09	Informal	17.4
Banks	22.47	155157.00	Mixed	12.6
Employer	0.65	55222.53	No loan	48.36
Moneylender	13.92	82541.40	If mixed, average share of total outstanding amount obtained from informal sector	44.44
Shopkeeper	4.83	20971.62		
Relatives	10.59	48568.79		

Land class wise access to credit

Land class	No loan	Only formal	Only informal	Mixed
Marginal	52.57	14.35	23.12	9.96
Small	47.99	25.15	13.34	13.53
Medium	42.18	30.81	10.93	16.08
Large	38.28	32.72	11.6	17.4

Agency wise satisfaction about the received prices

Agency code	Satisfactory (%)	Not satisfactory: lower than market price (%)	Delayed payments (%)	Deductions for loan borrowed (%)
Local private	71.06	26.8	0.63	0.11
Mandi	80.41	17.8	0.34	0.1
Input dealers	65.68	32.44	1.04	0.5
Cooperative/government	79.73	11.17	4.55	0.34
Processors	77.32	16.25	2.75	0
Others	79.74	16.73	0.41	0.05
Unspecified (others)	57.14	32.14	0	0

Average normalized price by credit source and marketing channel

Channel	Only formal sources	Both formal and informal	Only informal source	No outstanding amount
Local private	-0.026	-0.058	-0.021	-0.012
Mandi	0.057	0.003	-0.005	0.009
Input dealers	-0.023	0.022	-0.078	-0.029
Cooperative/government agency	0.179	0.102	0.094	0.152
Others	0.001	0.011	-0.036	0.039

Outcome Variable

- To pool data to make comparisons on the aggregate, across crops and regions
- Price variable was converted into standard deviation units
- Transaction price was subtracted by the mean price for that commodity in the specific NSS region and divided it by the standard deviation of the price distribution for that commodity in the specific NSS region
- *Standardized Price*, $\tilde{P}_{icm} = \frac{P_{icm} - \bar{P}_{cr}}{\sigma_{cr}}$

Model

- $\tilde{P}_{icm} = \beta_0 + \beta_1 \tilde{Q}_{icm} + \beta_2 \text{Informal}_i + \sum_m \beta_m M_{ic} + \sum_k \beta_k \text{Informal}_i * M_{ic} + Z_i + C_i + D_i + \varepsilon_{icm}$
- \tilde{P}_{icm} : Standard deviation adjusted prices
- \tilde{Q}_{icm} : Standard deviation adjusted quantity sold
- Informal_i : Dummy for credit access from informal source
- M_{ic} : Marketing channels
- $\text{Informal}_i * M_{ic}$: Interaction between credit source and marketing channel
- Z_i , C_i and D_i : Farmer characteristics, crop dummies and district dummies respectively

Results

- Effect of interlinked markets on prices received by farmers
- Effect of interlinked markets (inputs procured from input dealers in visit1) on prices received by farmers in visit 2.
- Effect of interlinked markets (seeds procured from input dealers in any visit) on prices received by farmers in visit 2.
- Effect of interlinked markets (positive amount outstanding in visit 1) on prices received by farmers in visit 2.
- Effect of interlinked markets on prices received by farmers with unique or multiple sales

	Prices	Prices	Prices
Formal only and mixed (D) (base)			
Only informal (D)	0.027 (0.02)	0.028 (0.02)	0.033* (0.02)
No loans (D)	0.034*** (0.01)	0.014 (0.01)	0.027* (0.01)
Local private (D) (base category)			
Mandi (D)	0.083*** (0.02)	0.092*** (0.02)	0.090*** (0.02)
Input dealers (D)	0.034 (0.03)	0.036 (0.03)	0.047* (0.03)
Cooperative/government agency (D)	0.255*** (0.02)	0.259*** (0.02)	0.267*** (0.02)
Formal only and mixed # channels (base)			
Only informal # mandi	-0.063** (0.03)	-0.062** (0.03)	-0.070** (0.03)
Only informal # input dealers	-0.096* (0.05)	-0.109** (0.05)	-0.108** (0.05)
Only informal # cooperative/government agency	-0.103** (0.05)	-0.098* (0.05)	-0.110** (0.05)
No loans # mandi	-0.062*** (0.02)	-0.061*** (0.02)	-0.070*** (0.02)
No loans # input dealers	-0.057* (0.03)	-0.034 (0.04)	-0.058* (0.04)
No loans # cooperative/government agency	-0.040 (0.03)	-0.051 (0.03)	-0.029 (0.03)
Crop groups (D)	Yes	Yes	Yes
District (D)		Yes	
District infrastructural variables			Yes
Constant	-0.117***	-0.108***	-0.390***

**Std prices (Inputs procured
from input dealer in visit 1)**

whether procured other inputs from input dealer in visit1=1	0.090 ^{***}
Local private (base)	(0.03)
Mandi	0.029
	(0.02)
Input dealers	0.023
	(0.03)
Cooperative/government agency	0.263 ^{***}
	(0.04)
Whether procured other inputs from input dealer in visit1=1 # local private (base)	
Whether procured other inputs from input dealer in visit1=1 # mandi	-0.059
	(0.05)
Whether procured other inputs from input dealer in visit1=1 # input dealers	-0.150 ^{**}
	(0.07)
Whether procured other inputs from input dealer in visit1=1 # cooperative/government agency	-0.121 [*]
	(0.08)
Constant	-0.321 ^{***}
	(0.08)
N	22166

**Std prices (Seeds procured from
input dealer in first visit)**

Procured seeds from input dealer in any of the visits=1	0.041 (0.03)
Local private (base)	
Mandi	0.038** (0.02)
Input dealers	0.003 (0.03)
Cooperative/government agency	0.271*** (0.03)
Procured seeds from input dealer in any of the visits=1 # local private	
Procured seeds from input dealer in any of the visits=1 # mandi	-0.054 (0.04)
Procured seeds from input dealer in any of the visits=1 # input dealers	-0.129** (0.06)
Procured seeds from input dealer in any of the visits=1 # cooperative/government agency	-0.184*** (0.07)
Constant	-0.288*** (0.08)
N	24205
r2	0.012

**Std prices (Farm household with
positive amount outstanding in first
visit)**

Whether procured other inputs from input dealer in visit1=1	0.079 ^{***} (0.03)
Whether procured seeds from input dealer in visit1	-0.075 ^{**} (0.03)
Local private (base)	
Mandi	0.001 (0.02)
Input dealers	0.006 (0.03)
Cooperative/government agency	0.170 ^{***} (0.05)
Amount outstanding in visit1 dummy=1	-0.010 (0.02)
Amount outstanding in visit1 dummy=1 # local private (base)	
Amount outstanding in visit1 dummy=1 # mandi	0.049 (0.03)
Amount outstanding in visit1 dummy=1 # input dealers	-0.001 (0.05)
Amount outstanding in visit1 dummy=1 # cooperative/government agency	0.131 ^{**} (0.06)
Constant	-0.309 ^{***} (0.08)
N	22098
r2	0.013

	Std prices (Farmers that use single agency)	Std prices (Farmers that use multiple agency)
Formal only and mixed (base)		
Only informal	0.038 [*] (0.02)	0.022 (0.09)
No loans	0.028 [*] (0.01)	0.047 (0.06)
Local private (base)		
Mandi	0.098 ^{***} (0.02)	0.043 (0.06)
Input dealers	0.047 (0.03)	0.061 (0.09)
Cooperative/government agency	0.238 ^{***} (0.03)	0.494 ^{***} (0.08)
Only informal # local private		
Only informal # mandi	-0.096 ^{***} (0.03)	0.188 (0.12)
Only informal # input dealers	-0.100 [*] (0.05)	-0.172 (0.18)
Only informal # cooperative/government agency	-0.115 ^{**} (0.06)	0.009 (0.17)
No loans # local private		
No loans # mandi	-0.086 ^{***} (0.02)	0.007 (0.08)
No loans # input dealers	-0.060 (0.04)	-0.093 (0.11)
No loans # cooperative/government agency	-0.004 (0.04)	-0.243 ^{**} (0.11)

Robustness tests

- Data limitation: no information on source of borrowing in both the visits
- Proportion of loan or amount matters more than whether one has borrowed or not
- Cropping choice could be endogenous
- Probably farmers sell holding out for a better price, selection correction for zero sale

Conclusion

- Persistence of interlinked transactions
- Evidence supports theoretical prediction of interlinked credit-output models
- Implication for e-NAM which neglects the presence of interlinked markets: farmers borrow from commission agents or input dealers and sell back to them
- Gangopadyay and Sengupta (1986): an intervention directly in the product market neglecting credit market would lead to in efficiency.