

UC Berkeley

Agriculture for Development

Title

Networks, Local Institutions and Agriculture

Permalink

<https://escholarship.org/uc/item/11f431jh>

Author

Udry, Chris

Publication Date

2009-07-01



Center of Evaluation for Global Action
Working Paper Series

Agriculture for Development
Paper No. AfD-0906
Issued in July 2009

Networks, Local Institutions and Agriculture.

Chris Udry

Yale University

This paper is posted at the eScholarship Repository, University of California.
<http://repositories.cdlib.org/cega/afd>
Copyright © 2009 by the author(s).

Series Description: The CEGA AfD Working Paper series contains papers presented at the May 2009 Conference on “Agriculture for Development in Sub-Saharan Africa,” sponsored jointly by the African Economic Research Consortium (AERC) and CEGA.

Recommended Citation: Chris Udry. (2009) Seasonality, precautionary savings and health uncertainty: Evidence from farm households in Central Kenya. CEGA Working Paper Series No. AfD-0906. Center of Evaluation for Global Action. University of California, Berkeley.

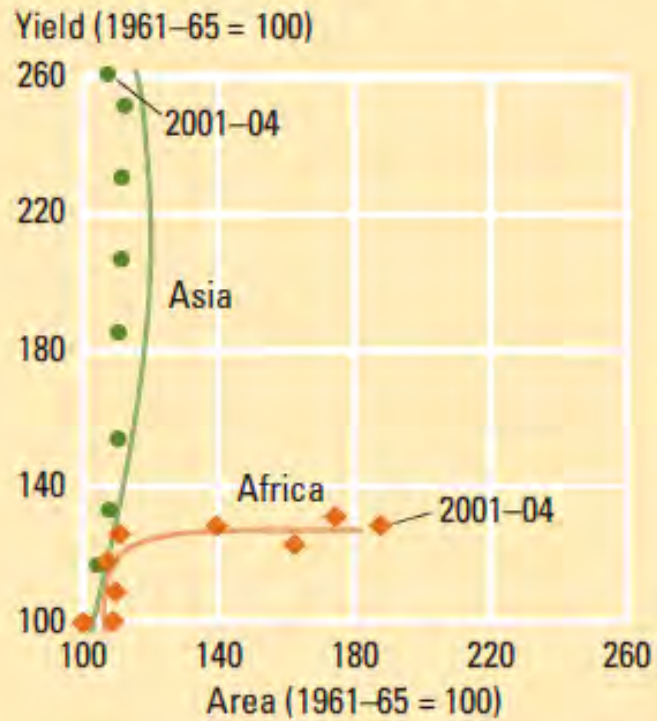
Networks, Local Institutions and Agriculture

Notes Towards a Research Program

Chris Udry, Yale University

May 2009

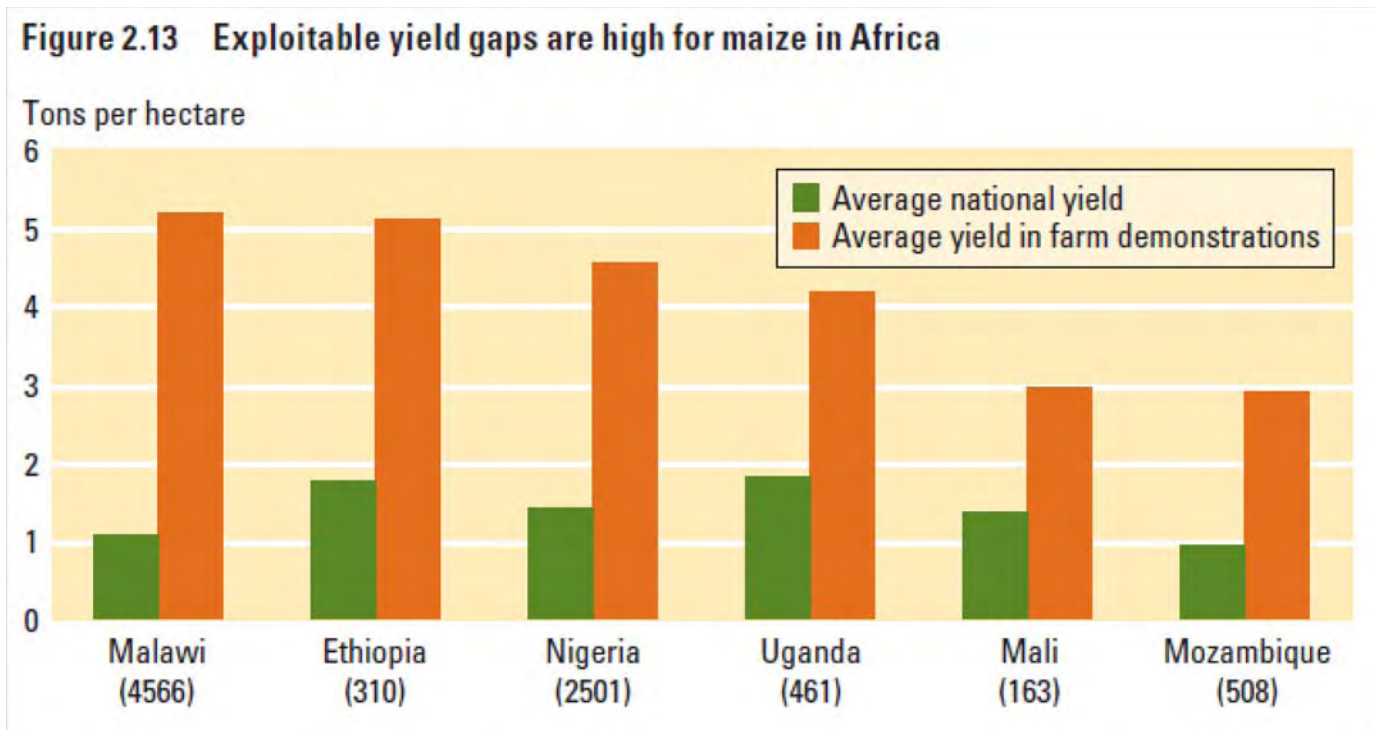
Expansion of cereal production has followed very different paths in Sub-Saharan Africa and Asia



1. Lack of profitable opportunities to intensify/adopt new technology

(a) No useful technology, farmers already at optimum – need investment in agric research

but we don't believe this:



- (b) Constraints due to land quality
 - (c) Inadequate infrastructure: roads, electricity, irrigation
 - (d) Market failures in input or output markets (e.g., seed certification; poorly organized trading systems; lack of information about market prices)
 - (e) Low human capital
 - (f) Coordination failures (need critical mass of investors to generate support services)
2. Credit constraints plus fixed costs of entry
 3. Risk and imperfect insurance

4. Information/learning about new technologies

5. Imperfect land rights, hence inadequate investment

All of these must be true in at least some instances. Yet research is utterly inadequate. Example: Google Scholar shows 21,500 papers/books/chapters on “Africa agriculture” since 2000. Same period: U.S. banks get 402,000.

Three Research Programs on networks, community organization and agriculture

I. Insurance, risk, and financial networks

- Finding: during the crises of the 1980s in Burkina Faso, we find that shocks to income due to both aggregate and idiosyncratic rainfall fluctuations translate directly into shocks to consumption (Kazianga and Udry, 2006). In support, (Christiaensen and Dercon, 2008); Dupas (2008)

Regions	Villages	Shock nature	Average Standard Deviation of Shock, over Mean Income
Sahel	Woure	Aggregate	0.50
		Idiosyncratic	0.27
	Silgey	Aggregate	0.67
		Idiosyncratic	0.33
Soudanian	Kolbila	Aggregate	0.46
		Idiosyncratic	0.27
	Ouonon	Aggregate	0.74
		Idiosyncratic	0.27
Northern-Guinean	Koho	Aggregate	0.53
		Idiosyncratic	0.24
	Sayero	Aggregate	0.23
		Idiosyncratic	0.33

Rainfall-induced variation in income in Burkina Faso

	(1)
Permanent income	0.432 [0.183]**
Transitory income	0.551 [0.059]***
Unexplained income	0.481 [0.056]***

Response of Consumption to Rainfall-Induced Changes in Income

- – Median calorie consumption at the time: < 2000 , 30% below WHO recommendations for moderate activity
- Standard deviation of these shocks $\approx 1/2$ of mean income
- Half of those shocks translate directly into consumption.
- NO evidence of insurance; only smoothing is via grain stocks

Thus we have some evidence of breakdown of community risk-sharing mechanism. Related work by Christiaensen and Dercon, 2008 shows effect on technology adoption.

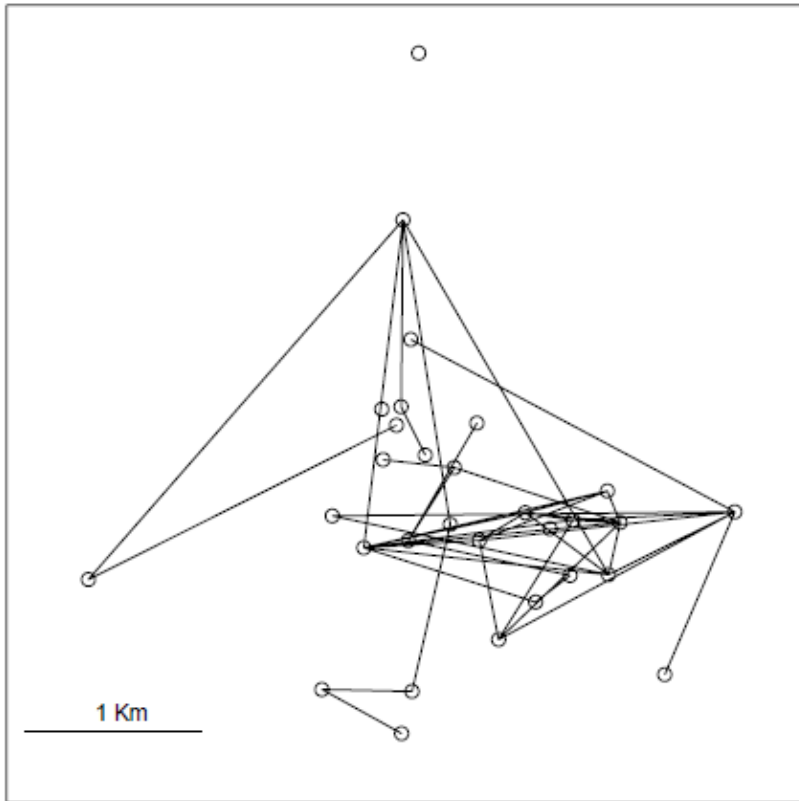
- BUT different findings in other places: . (De Weerdt and Dercon for Tanzania 2006; Suri for Kenya; Udry 1996 for Nigeria; Fafchamps 2008 review)

- Key research agenda: in different environments, do binding credit constraints or imperfect insurance influence input choice and/or technology adoption?
 - Failure to adopt otherwise profitable technology/optimal input use may be a consequence of binding credit constraints, or imperfect insurance.
 - We have a program of interventions for maize farmers in Tamale to distinguish their relative importance (Aryeetey, Karlan, Osei, Osei-Akoto, Udry)
- Provide free rainfall insurance to random set of farmers - payoffs during farming season, month by month
- Provide capital drops to a second random set of farmers - provided when requested

- These two independent sources of exogenous variation provide the instruments for distinguishing capital constraints from imperfect insurance and risk aversion, subject to a stunning array of practical and conceptual hurdles
- Both can be replicated in other situations where there are trials of rainfall or price insurance, or microfinance for agriculture.

II. Learning and Innovation

- Finding: (Conley/Udry, forthcoming) Farmers are uncertain about the production technology for a new crop; rely on the experiences of a network of information connections. Learning is sophisticated, 'semiparametric' and local.



Network of Information Flows in One Community

Table 3: Transitions in Fertilizer Use and Receipt of Information

		Current Fertilizer Use		
		Zero	Positive	
Previous Fertilizer Use	Zero	Count	55	12
		Avg $M_{i,t}$	0.44	0.86
		Avg $s(\text{bad}, x=x_{i,\text{previous}})$	0.015	0.090
	Positive	Count	17	29
		Avg $M_{i,t}$	-3.30	-0.03
		Avg $s(\text{bad}, x=x_{i,\text{previous}})$	0.125	0.007

Farmers change fertilizer use in the direction of good news; and away from bad

- BUT, Duflo, Kremer and Robinson show NO evidence of social learning in Busia:

Table 6: Adoption for Other Contacts of Demonstration Plot Farmers

	<i>1 season later</i>		<i>2 seasons later</i>	
Panel A: Agricultural Contacts of Demonstration Plot Farmers (not invited to witness treatment)				
	(1)	(2)	(3)	(4)
	<i>fertilizer</i>	<i>any treatment</i>	<i>fertilizer</i>	<i>any treatment</i>
Pilot Friend (not invited to treatment)	0.017	-0.019	-0.01	-0.001
	(0.037)	(0.041)	(0.041)	(0.044)
Observations	547	545	436	436
Panel B. Neighbors of Demonstration Plot Farmers				
	(1)	(2)	(3)	(4)
	<i>fertilizer</i>	<i>any treatment</i>	<i>fertilizer</i>	<i>any treatment</i>
Pilot Neighbor	-0.04	-0.071	-0.037	-0.037
	(0.049)	(0.055)	(0.048)	(0.051)
Observations	264	264	383	383

Standard errors in parentheses

Pattern of adoption of a profitable fertilizer treatment in Busia, Kenya

- – Is Busia just different? Is the technology different, the market environment, social interactions?
 - This matters, because social learning is fundamental to almost all extension strategies.
- Research Agenda: how is information spread and knowledge generated about agriculture in rural communities?

Another example of realm in which tools of program evaluation can be useful

- MCC evaluation in Ghana (MiDA) by ISSER (Aryeetey)
 - Key element of MCC program is business training for FBOs
 - Pair of baseline surveys (GLSS5+ & FBO). Provide information on social networks + geography
 - Randomize order of training
 - Follow-up survey of FBOs, and 2nd round of GLSS5+
 - Estimate impact of FBO intervention (but, starter packs); also of spillovers to untrained farmers

- Basic design easy to replicate wherever extension program does not have resources to reach everyone at once

III. Property Rights

- Finding (Conley/Udry, 2008): Rights to land in most of West Africa are obtained via membership in a corporate group; in most of southern Ghana that group is the matrilineage.
 - Huge advantage: prevents emergence of landless class; clearly part of risk mitigation strategy
 - But, we find enormous efficiency cost:

TABLE 4
PROFITS AND FALLOW DURATION

	OLS DV: Profit × 1,000 Cedis/Hectare (1)	OLS DV: Fallow Duration (2)	IV DV: Profit × 1,000 Cedis/Hectare (3)
Fallow duration (years)*	145 (48)		541 (233)
Gender: 1 = woman	-473 (393)	-.58 (.67)	130 (555)
Age			
> 6 years of school			
1 if first of family in town		-.44 (.66)	
Years family/respondent lived in village		-.01 (.01)	
1 if respondent holds traditional office		3.91 (1.11)	
Number of wives of father		.39 (.35)	
Number of father's children		-.08 (.07)	
Parity of mother in father's wives		-.44 (.41)	
1 if fostered as a child		.86 (.74)	
Size of inherited land		-.29 (.63)	

THE HAZARD OF EXPROPRIATION		
	YEARS PLOT HAS BEEN HELD BY CULTIVATOR: MEAN (1)	ANNUAL RATE OF EXPROPRIATION WHILE FALLOW:* MAXIMUM LIKELIHOOD (2)
Officeholders:		
Male, plot from same <i>abusua</i>	16.41 (1.85)	.20 (.024)
Female, plot from same <i>abusua</i>	11.09 (1.20)	.24 (.034)
Male, plot from different <i>abusua</i>	12.90 (1.81)	.22 (.019)
Female, plot from different <i>abusua</i>	12.74 (7.32)	.27 (.029)
Nonofficeholders:		
Male, plot from same <i>abusua</i>	8.90 (.74)	.29 (.015)
Female, plot from same <i>abusua</i>	7.86 (1.20)	.34 (.022)
Male, plot from different <i>abusua</i>	6.59 (.51)	.35 (.018)
Female, plot from different <i>abusua</i>	4.95 (.79)	.41 (.023)
Observations	753	753

as a consequence, agricultural profits in this farming system are $\approx 1/3$ lower than what they otherwise would be.

- BUT, other studies do not find such dramatic effects of property rights on investment in Africa (Brasselle, Gaspart Platteau in Burkina Faso; Baland et al in Uganda). Typically, no impact is found, although there are often difficult econometric problems
- Research Agenda:
 - Informal property rights: detailed studies that are sufficiently rich to uncover variation in security that is implicit
 - Work with titling programs (Goldstein, Udry). Ghana Land Administration Project, issuing titles in selected districts; MCC supported in part. Use the district boundary to separate treatment and control farmers; panel data to identify changes in investment, profits, and financial arrangements. Main difficulty – possibility that other services change at the same district boundary.

Why all these studies in Ghana?

- A 'lab' environment – infrastructure set up, easy to mobilize new studies.
- ISSER/Yale panel surveys: 5,000 households over at least 15 years, every 3 years. Follow migrants.
- Yale-ISSER-MiDA-MoFA-NGO cooperation: Baseline survey provided by 2008/9 GLSS5+ survey, designed for evaluation of MCC/MiDA program. Follow-up in 2010/2011.
- Ongoing collaboration with a number of NGOs (Presby Agric, EWB, Technoserve; MIA, IPA provides infrastructure and core team.

- High-level cooperation from government, aided by IGC.

- Many elements of this replicable in other places:
 - WB/Gates agriculture surveys, following design of Yale surveys

 - IGC country programs

 - But, better, programs emerging from scholars resident in the country