Food and Agriculture Organization of the United Nations

More productive for better jobs.

Labour productivity and decent employment in rural Tanzania

Piero Conforti, Elisenda Estruch, Gianluigi Nico and Mario Spiezio

GLOBAL CONFERENCE ON
PROSPERITY, EQUALITY AND SUSTAINABILITY
PERSPECTIVES AND POLICIES FOR A BETTER WORLD

1-3 June 2016
VENUE: India International Centre, Lodhi Estate, New Delhi, India

PROSPERITY EQUALITY SUSTAINABILITY GLOBAL CONFERENCE 2016

Introduction

- How to promote the demand for attractive and productive jobs in agriculture and rural areas ?
- Do “decent” jobs stimulate productivity, or do they only materialize when productivity increases?
- “decency” and productivity can be positively or negatively correlated
- Measuring “decency” in agriculture and rural areas calls for specific indicators (Oya, 2015; ILO, 2016)

Objective: test whether higher productivity increases the probability to find more decent jobs in agriculture and in other activities

- Focus on family labour

Outline

- Surplus labour, productivity and decent work
- Test, data and econometric strategy:
  - Step 1: Production function
  - Step 2: IV Probit
- Results:
  - The production function: Marginal productivity of Family Labour
  - Decent work and productivity through three indicators
- Discussion

Surplus labour, productivity and decent work

- Surplus labour and disguised unemployment found in traditional agriculture – dualistic labour markets
- Expected to evolve as demand from non ag increases and workers migrate to (expected) higher remunerations

but

- pulling can be limited by slow growth and structural constraints – generating poverty traps
- Surplus labour in agriculture is expected to be low-quality:
  - low wage or returns;
  - "last resort" employer
- "decent" work in agriculture?
  - large amount of unskilled labor; contributing family workers, self employed
  - peaks in demands
  - dependency upon erratic earnings; multiple activities, use of marginal labor

Test and data

Question: does increasing labour productivity reduce the likelihood to hold a decent job?

Data:

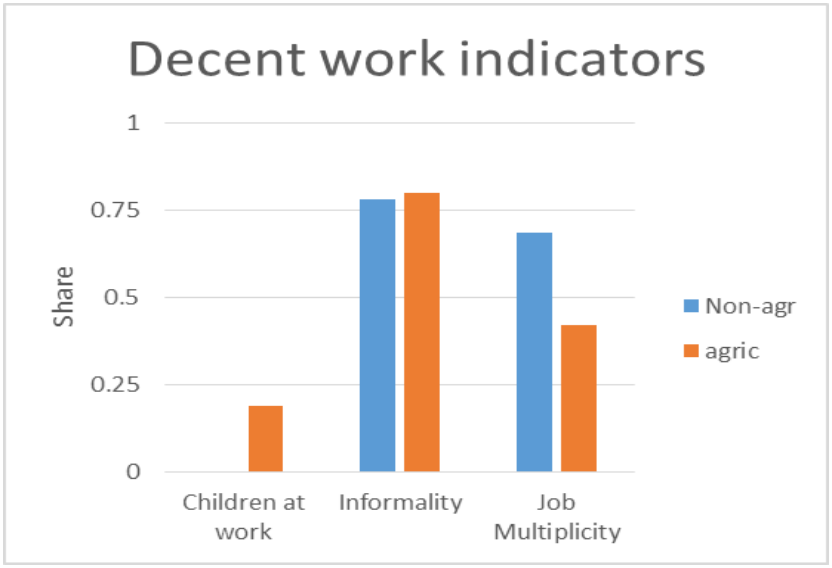
- Tanzania National Panel Survey (TZNPS) 2012-13
- Sample: 5,015 households and 25,395 individuals
- Final # of observations: 2,490 (non-ag) and 5,084 (agricultural)

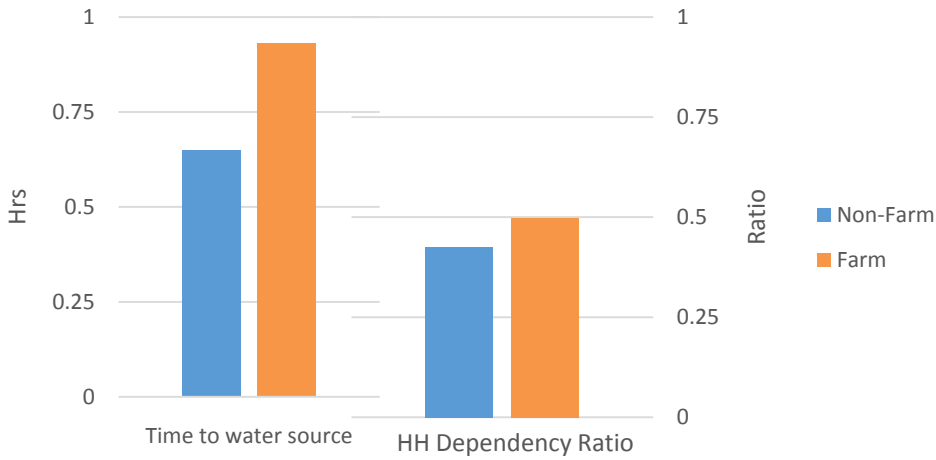
Indicator	Criteria
Informality	Employment statuses: a) contributing family workers b) own-account workers with no employees hired on a continuous basis.
Job multiplicity	Performing more than 1 job over a 12 month period
Children at work	a) age range 5-14 b) average hours worked per week: > 14 hrs c) unpaid work d) not attending school

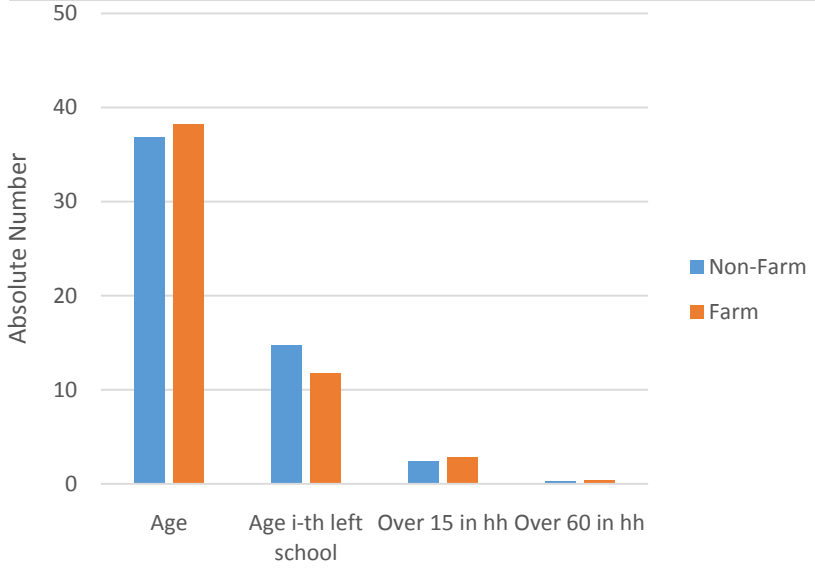
Descriptive Statistics (a)

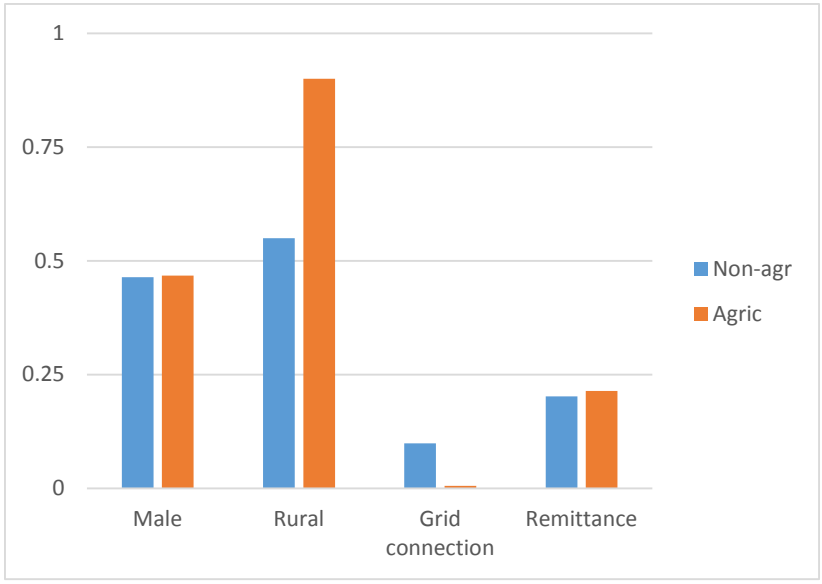
	Non-agriculture				Agriculture			
Variables	*Weighted mean*	*Std. Err. linearized*	*[95% Conf. Int.]*		*Weighted mean*	*Std. Err. linearized*	*[95% Conf. Int.]*	
Gross Value of production	7,513,973	701,274	6,138,833	8,889,114	117,009	4,043	109,082	124,936
Contributing Family Workers	63.15	1.49	60.23	66.07	44.98	0.62	43.77	46.19
Hired Labour	0.301	0.025	0.251	0.35	3.926	0.227	3.482	4.371
Physical capital	1,031,973	167,459	703,599	1,360,347	344,184	166,560	17,654	670,714
Variable capital	2,893,999	444,103	2,023,149	3,764,849	10,646	519	9,629	11,665
Land (ha)					3.401	0.09	3.224	3.578

Descriptive Statistics (b)









Estimation strategy (a)

a. By-sector translog production function

$$ln\, y_{i,a} = \beta_{0,a} + \left(\sum_{j=1}^{5} \beta_a ln\, X_{i,a}\right) + \left(\frac{1}{2} * \sum_{i=1}^{5} \alpha_1 \,(lnX_{i,a})^2\right) + \left(\sum_{j=1}^{5} \rho_{i,a}\, LnX_{i,a} LnX_{i,a}\right) + v_{i,a} + \varepsilon_{i,a}$$

$$ln\, y_{i,na} = \beta_{0,na} + \left(\sum_{j=1}^{4} \beta_a ln\, X_{i,na}\right) + \left(\frac{1}{2} * \sum_{i=1}^{4} \alpha_1 \,(lnX_{i,na})^2\right) + \left(\sum_{j=1}^{4} \rho_{i,na}\, LnX_{i,na} LnX_{i,na}\right) + v_{i,na} + \varepsilon_{i,na}$$

Estimation strategy (a)

a. By-sector translog production function

$$ln\, y_{i,a} = \beta_{0,a} + \left(\sum_{j=1}^{5} \beta_a ln\, X_{i,a}\right) + \left(\frac{1}{2} * \sum_{i=1}^{5} \alpha_1 \,(lnX_{i,a})^2\right) + \left(\sum_{j=1}^{5} \rho_{i,a}\, LnX_{i,a} LnX_{i,a}\right) + v_{i,a} + \varepsilon_{i,a}$$

$$ln\, y_{i,na} = \beta_{0,na} + \left(\sum_{j=1}^{4} \beta_a ln\, X_{i,na}\right) + \left(\frac{1}{2} * \sum_{i=1}^{4} \alpha_1 \,(lnX_{i,na})^2\right) + \left(\sum_{j=1}^{4} \rho_{i,na}\, LnX_{i,na} LnX_{i,na}\right) + v_{i,na} + \varepsilon_{i,na}$$

b. Elasticities of family labour

$$\partial Y/\partial X_{i,a} = \beta_{i,a} + \gamma_{ii} LnX_i + \sum_{i \neq j} \rho_{ij} LnX_j$$

$$\partial Y/\partial X_{i,na} = \beta_{i,na} + \gamma_{ii} LnX_i + \sum_{i \neq j} \rho_{ij} LnX_j$$

Estimation strategy (a)

a. By-sector translog production function

$$ln\, y_{i,a} = \beta_{0,a} + \left(\sum_{j=1}^{5} \beta_a ln\, X_{i,a}\right) + \left(\frac{1}{2} * \sum_{i=1}^{5} \alpha_1 \,(lnX_{i,a})^2\right) + \left(\sum_{j=1}^{5} \rho_{i,a}\, LnX_{i,a} LnX_{i,a}\right) + v_{i,a} + \varepsilon_{i,a}$$

$$ln\, y_{i,na} = \beta_{0,na} + \left(\sum_{j=1}^{4} \beta_a ln\, X_{i,na}\right) + \left(\frac{1}{2} * \sum_{i=1}^{4} \alpha_1 \,(lnX_{i,na})^2\right) + \left(\sum_{j=1}^{4} \rho_{i,na}\, LnX_{i,na} LnX_{i,na}\right) + v_{i,na} + \varepsilon_{i,na}$$

b. Elasticities of family labour

$$\partial Y/\partial X_{i,a} = \beta_{i,a} + \gamma_{ii} LnX_i + \sum_{i \neq j} \rho_{ij} LnX_j$$

$$\partial Y/\partial X_{i,na} = \beta_{i,na} + \gamma_{ii} LnX_i + \sum_{i \neq j} \rho_{ij} LnX_j$$

c. Marginal returns of family labour for individual *i-th*

$$MPFL_{i,a} = \widehat{ln\, y_{i,a}} * \partial Y/\partial X_{1,a}$$

$$MPFL_{i,na} = \widehat{ln\, y_{i,na}} * \partial Y/\partial X_{i,na}$$

Estimation strategy (b)

d. Probit model

$$Pr\left(DW_{i,a} = 1 \,\middle|\, X = x_{i,a}\right) = \Phi(x'_{i,a}, MPFL_{i,a})$$
$$Pr\left(DW_{i,na} = 1 \,\middle|\, X = x_{i,na}\right) = \Phi(x'_{i,na}, MPFL_{i,na})$$

Estimation strategy (b)

d. Probit model

$$Pr\left(DW_{i,a} = 1 \,\middle|\, X = x_{i,a}\right) = \Phi(x'_{i,a}, MPFL_{i,a})$$
$$Pr\left(DW_{i,na} = 1 \,\middle|\, X = x_{i,na}\right) = \Phi(x'_{i,na}, MPFL_{i,na})$$

However, both

$DW = f(MPLF)$ and $MPLF = g(DW)$

may be true => endogeneity

We use an IV Probit to circumvent it.

Estimation strategy (b)

d. Probit model

$$Pr(DW_{i,a} = 1 \mid X = x_{i,a}) = \Phi(x'_{i,a}, MPFL_{i,a})$$
$$Pr(DW_{i,na} = 1 \mid X = x_{i,na}) = \Phi(x'_{i,na}, MPFL_{i,na})$$

However, both
$DW = f(MPLF)$ and $MPLF = g(DW)$
may be true => endogeneity
We use an IV Probit to circumvent it.

Instrument: birth cohorts

- Colonial era and post-independence (till 1967)
- State Socialism (1968-1985)
- Structural Reforms (1986 and on)

Results: Production function

	Agriculture	Non-Agriculture
Contributing Family Worker (CFW)	0.0756 (-0.118)	0.590*** (-0.226)
CFW, squared term	0.118*** (-0.0304)	0.124** (-0.050)1
CFW*Hired Labour	-0.0423*** (-0.015)	-0.00587 (-0.0667)
CFW*Physical Capital	0.00133 (-0.00366)	-0.0157* (-0.00929)
CFW*variable Capital	-0.0111*** (-0.0039)	-0.0453*** (-0.00732)
CFW*Land	-0.0849*** (-0.0204)	-
Elasticity	0.36	0.47
Observations	5,084	2,490

Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

Results: Informality

	Agriculture	Non-Agriculture
	IV Probit	Probit
MPFL	-3.481***	-0.668***
	(0.175)	(0.063)
Rural area	-0.143	0.108
	(0.100)	(0.105)
Age	-0.046***	0.005
	(0.012)	(0.016)
Age-squared	0.000***	0.000
	(0.000)	(0.000)
Age left school	-0.005	0.026**
	(0.007)	(0.013)
Age left school-squared	0.000*	-0.001***
	(0.000)	(0.000)
Sex (Male=1)	-0.095	-0.315***
	(0.063)	(0.067)
HH Size (log)	0.068	0.113
	(0.068)	(0.074)
HH Dependency ratio (log)	-0.044	0.478*
	(0.180)	(0.253)
Remittance	-0.031	-0.195**
	(0.069)	(0.079)

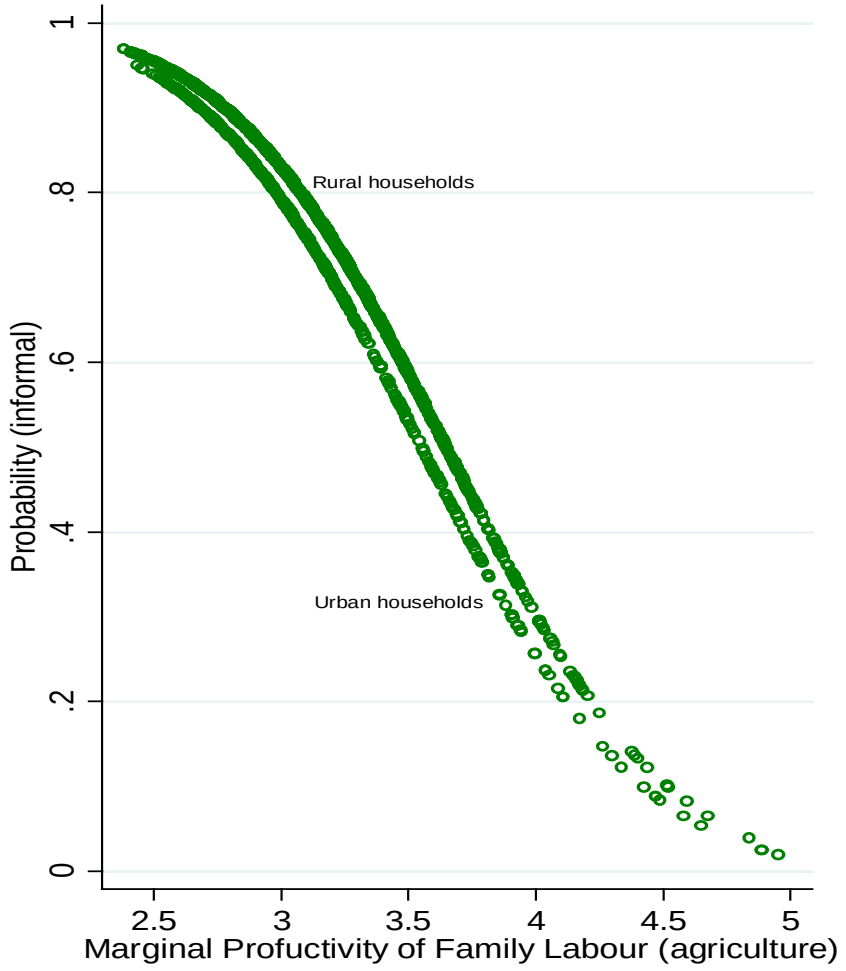
Results: Job Multiplicity

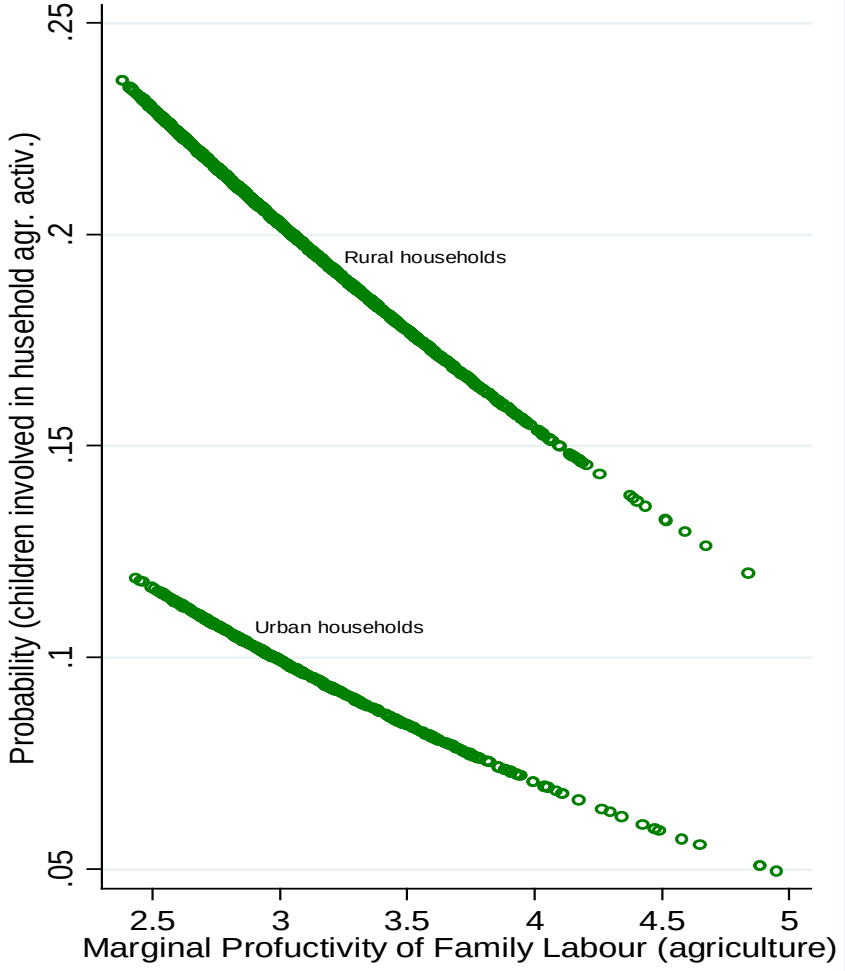
	Agriculture	Non-Agriculture
	Probit	IV Probit
MPFL	-0.036	-1.039***
	(0.089)	(0.376)
Rural area	-0.229***	1.019***
	(0.079)	(0.222)
Age	0.080***	0.047***
	(0.006)	(0.013)
Age-squared	-0.001***	-0.000***
	(0.000)	(0.000)
Age left school	0.017***	0.007
	(0.005)	(0.011)
Age left school-squared	0.000	0.000
	(0.000)	(0.000)
Sex (Male=1)	0.262***	0.142**
	(0.044)	(0.071)
HH Size (log)	-0.426***	0.171***
	(0.060)	(0.060)
HH Dependency ratio (log)	0.421**	0.094
	(0.183)	(0.178)
Remittance	0.127*	0.150*
	(0.071)	(0.085)
Time to water	0.074*	0.016
	(0.042)	(0.076)
Regional share to grid	-1.090	-1.378***

Results: Children at work

	AGRICULTURE
	IV Probit:
MPFL	-3.138***
	(0.114)
Rural area	-0.163
	(0.108)
Age	-0.022***
	(0.006)
Age-squared	0.000***
	(0.000)
Age left school	0.015*
	(0.008)
Age left school-squared	-0.000
	(0.000)
Sex (Male = 1)	0.032
	(0.025)
HH member age <15 (log)	0.117**
	(0.048)
Remittances	0.019
	(0.076)
Time to water (log)	0.035
	(0.037)
Regional share of people connected to grid	0.348
	(3.138)

MPL vs informal employment and children at work: differences between rural and urban households





Discussion

- Surplus labour appears in the sample: limited MPFL in agriculture → structural constrains likely to prevent mobility out of agriculture. Higher MPFL in non-ag activities
- Higher MPFL
  - ❖ decreases the probability of being informal
  - ❖ decreases the probability of children at work
  - ❖ reduces the probability of multiple jobs, only in agriculture (caution IV model)
- Increasing productivity, in these terms, can address the lack of decent work

Thank you

for your attention