AGRICULTURAL PRODUCTIVITY GROWTH IN AFRICA: NEW EVIDENCE FROM MICRODATA

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BACKGROUND AND MOTIVATION

- Importance of smallholder agriculture for development: 2/3 of the world's poor live in SSA, most in rural areas, and main economic activity is agriculture.
- SDGs 1 and 2: Target 2.3.1 'double agricultural productivity and incomes of small-scale food producers'
- Food security in the coming decades
- Increased spending on agricultural research to boost productivity
- So what do we know about productivity growth of smallholder agriculture in SSA? Examine trends in smallholder productivity using plot-level micro data

DATA AND VARIABLES

- LSMS-ISA from Ethiopia, Malawi, Mali, Niger, Nigeria, and Tanzania; 2008 to 2019, 130,000+ plot observations from 30,000 different farms.
- Longitudinal surveys, tracking of communities, households, individuals, parcels in some cases
- Two-stage stratified sampling, representative of population
- Outcome variable: value of production per hectare in constant USD, aggregated across crops on the same plot.
- Agricultural inputs: land area, family labor, value of hired labor, seeds, fertilizers, agricultural asset index.
- Plot, farmer, household characteristics.
- Weather data

ANALYTICAL APPROACH I

- Estimation of productivity growth over time:
  - Model 1: Raw time trend

$$\ln\left(\frac{Y_{it}}{L_{it}}\right) = \alpha + \beta year_t + C_i + \varepsilon_{it}$$

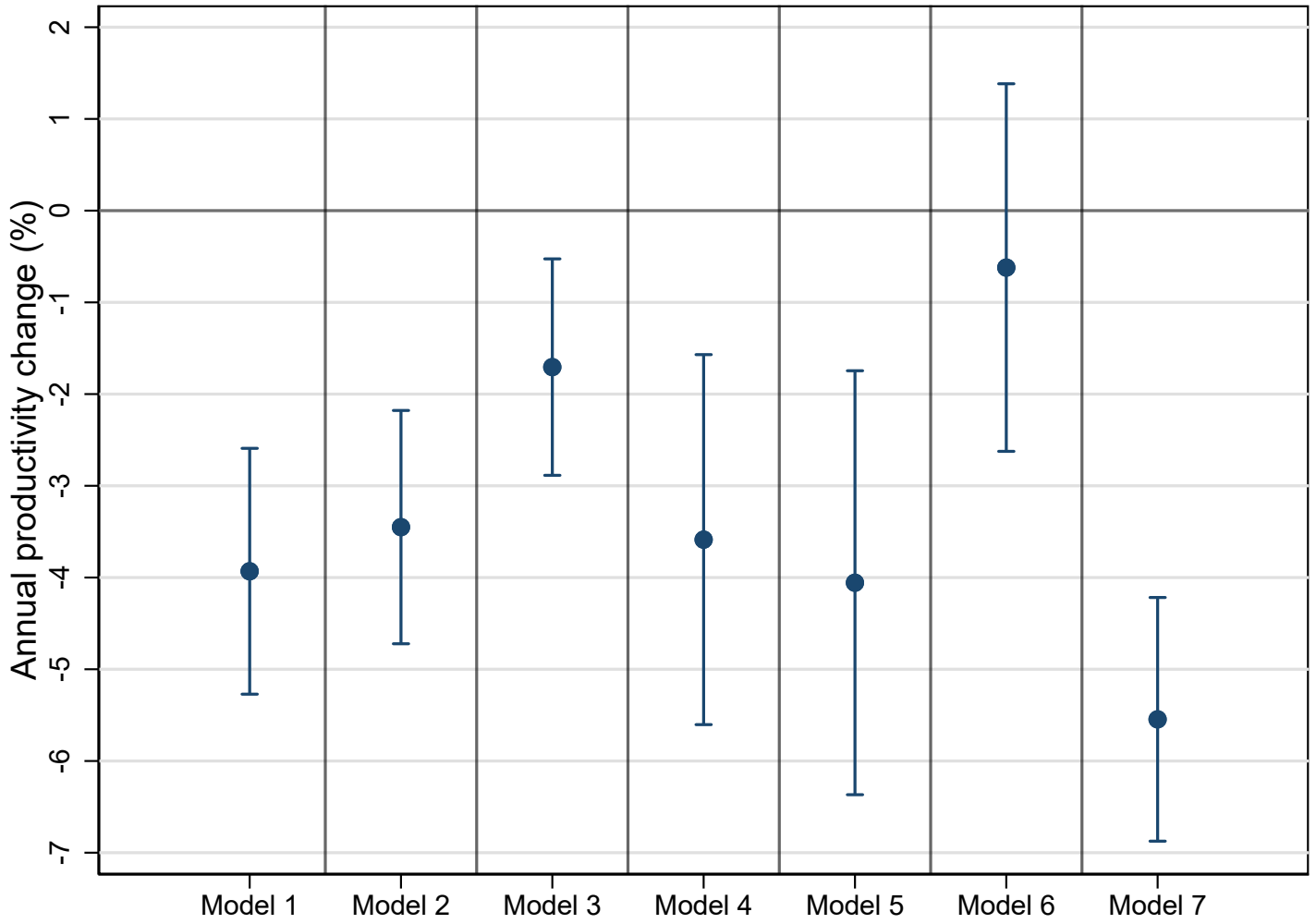
  - Model 2: Plot level model with a full set of controls

$$\ln\left(\frac{Y_{it}}{L_{it}}\right) = \alpha + \beta year_t + \sum_{j=1}^{J} \gamma_j \ln\left(\frac{I_{jit}}{L_{it}}\right) + \sum_{l=1}^{K} \delta_l (X_{lit}) + f(W_{it}) + \theta M_{it} + C_i + \varepsilon_{it}$$

ANALYTICAL APPROACH II

- Additional models for productivity growth over time
  - Model 3: Farm-level (rather than plot-level)
  - Model 4: Farm-level with farm/household fixed effects
  - Model 5: Farmer-level (aggregate all variables to farmer) with farmer fixed effects
  - Model 6: cluster-level with cluster fixed effects
  - Model 7: current, time and region specific prices, rather than constant prices
- Models estimated in OLS, weighted by adjusted population weights.

RESULTS – PRODUCTIVITY GROWTH



RESULTS – PRODUCTIVITY GROWTH BY COUNTRY

		Ethiopia (1)	Malawi (2)	Mali (3)	Niger (4)	Nigeria (5)	Tanzania (6)
Model 1: Simple time trend	Annual time trend	0.00198	-0.0378***	0.00743	0.353***	-0.0862***	0.00176
		(0.0138)	(0.00710)	(0.0225)	(0.0260)	(0.0108)	(0.0138)
	Sample size	36,195	17,056	30,817	8,184	17,148	7,383
	R-squared	0.000	0.010	0.000	0.120	0.020	0.000
Model 2: Preferred plot-level model	Annual time trend	-0.00005	-0.0354***	-0.0174	0.303***	-0.0483***	-0.00371
		(0.0131)	(0.00783)	(0.0251)	(0.0284)	(0.0108)	(0.0120)
	Sample size	36,195	17,056	30,817	8,184	17,148	7,383
	R-squared	0.237	0.336	0.469	0.446	0.408	0.379

RESULTS – OMITTED COUNTRIES

	Baseline (Model 2)	Ethiopia	Malawi	Mali	Niger	Nigeria	Tanzania
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Annual time trend	-0.0345***	-0.0429***	-0.0346***	-0.0345***	-0.0349***	-0.00500	-0.0399***
	(0.00649)	(0.00777)	(0.00709)	(0.00651)	(0.00654)	(0.00784)	(0.00757)
Sample size	115,628	79,433	98,572	84,811	108,599	98,480	108,245
R-squared	0.414	0.493	0.417	0.412	0.399	0.310	0.377

DISCUSSION AND CONCLUSIONS

- Summary
  - Negative overall time trend, holds across of range of specifications, with underlying country heterogeneity

- Limitations
  - Short panel
  - Household farms, household survey sampling

- Discussion/open questions
  - What could explain the absence of growth/negative growth?

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