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Impact of access to livestock services on technical efficiency of small-ruminant production in rural Ethiopia Girma T. Kassie^{1*}, Barbara Rischkowsky¹, Aynalem Haile¹, Mulugeta Yitayih¹

Introduction

There are limited or no rural services in small run markets of Ethiopia.

What do we know about the effect of the availability thereof these services on technical efficiency of live production? Virtually nothing!!

Our objective

- To empirically show whether access to one or more livestock services on the technical efficiency of smal ruminant production.
 - The services considered are agricultural extension on sh and goat, rural credit for sheep and goat, and sheep and market information.

Value Chains Sam Region District Highland Atsbi Sheep 1 Tigray SNNP Sheep 2 Doyogena Menz Amhara Sheep 3 (Mama & Gera) Horro Gudru Sheep 4 Oromia Amhara & Abergelle Goat 1 Tigray Lowland Yabello Goat 2 Oromia Shinelle Goat/Sheep Somali **Total Sample**

Sampling and study sites

Analytical framework- 1. Efficiency analysis (SF Model)

$y_i = \alpha + x'_i \beta + \varepsilon_i, \quad i = 2,..,N$ $\mathcal{E}_i = V_i - \mathcal{U}_i, \quad v_i \sim N(0, \sigma_v^2), \quad u_i \sim F$

 y_i is log of total gross revenue from shoats

 x_i vector of (log of) inputs

ε_i composite error

*v*_i idiosyncratic error

u_i inefficiency (one-side disturbance)

F we employed exponential and truncated normal distribution Efficiency computed using Jondrow et al (1982): E = exp(-E(s.) and Battese and Coelli (1988): $E = E[exp(-s.u|\varepsilon)]$ procedures. SFA (2 distributions x 2 efficiency measures) models estimated

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	2. Multivalued treatment effects modelling (MVTM)					Any effects on technical efficiency? Here is ATE										
•	 ATE - the average effect of giving each individual 							RA		IPW		AIF	W	IPW	'RA	
iminant	trootmont tinctood of trootmont 0.								Robust		Robu	st	Ro	bust	Robust	
	trea	atment <i>t</i> instead of	treatment 0:					Coef.	Std. Err.	Coef	. Std. E	rr. Co	ef. Sto	l. Err. Coe	f. St. Err.	
or lack vestock		ATE_t	$= \boldsymbol{E}(\boldsymbol{y}_t - \boldsymbol{y}_0)$		Ex vs	xtension s No serv	on shoat only ice	0.010	0.009	0.00	1 0.007	0.0	10 0.0	06 0.00	09 0.006	
	• POM - the POM for each treatment level is an average of each potential outcome: $POM_{i} = E(v_{i})$					larket inf s No serv	fo on shoat only vice	-0.015	0.013	0.01	0 0.008	-0.	0.0 0.0	10 -0.0	09 0.010	
						redit for s	shoat only vs	0.002	0.011	-0.02	L4 [*] 0.008	0.0	02 0.0	09 0.00	0.008	
	• $\Delta TFT - the average effect among those subjects that$					xtension	and mkt info vs	-0.003	0.009	-0.00	0.007	-0.	001 0.0	07 -0.0	03 0.007	
of key	receive treatment level \hat{t} of giving each subjects that treatment \tilde{t} instead of treatment 0: $ATET_{\tilde{t},\hat{t}} = E\{(y_{\tilde{t}} - y_0) t = \hat{t}\}$					tension	and credit vs	-0.004	0.013	-0.02	L6 0.013	0.0	03 0.0	09 0.00	0.009	
						lo service Ikt info a	nd credit vs No	0.018	0.024	-0.02	LO 0.027	-0.	011 0.0	33 0.00	0 0.021	
neep d goat						ervice Il service	s vs No service	-0.020*	0.012	-0.02	L8 0.011	-0.	005 0.0	09 -0.0	08 0.009	
	• MVTM requires three different trt levels: \tilde{t} denotes					lean Pote	ential Outcome									
	the	e trt level of the pote	ential outcome; 0 is the	e trt l	evel Se	ervices (N	No service)	0.730 [‡]	0.006	0.71	5 [‡] 0.004	0.7	09 [‡] 0.0	05 0.72	26 [‡] 0.005	
ple	of the control potential outcome; and $t = t$ restricts the expectation to include only those individuals who					Here is	ATET									
	act	ually receive trt leve	\hat{f} .						RA			IPW		IPWRA		
162	۸diu	'	bting procedures or		vod						Robust		Robust	•	Robust	
152	Aaju	istment and weigi	nting procedures er	πριο	yeu:	Internetion	on shoot only y		Co avico 0.0	et.	Std. Err.	Coet.	Std. Err	Coet.	Std. Err.	
155	 Regression adjustment (RA). 					Market in	fo on shoat only	vs No sei	-0.	014	0.009	0.001	0.007	-0.003	0.010	
133	 Inverse probability weighting (IPW). 					ervice										
157	 Augmented inverse probability weighting (AID\A/) 					Credit for	shoat only vs No and mkt info vs	e 0.0	03 102	0.010	-0.014	0.009	0.007	0.010		
160	- Augmenteu inverse probability weighting (AIPW)					Extension and credit vs No service				003	0.013	-0.018	0.013	0.001	0.010	
100	 Inverse probability weighting with regression adjustment (IPWRA). 					Mkt info and credit vs No service				18	0.025	-0.010	0.029	-0.003	0.022	
						All service	I services vs No service				0.012	-0.022*	0.012	0.004	0.009	
159	Resu Techr	ults bical efficiency estimate	es of households given the	eir acc	ν Σ Δ	Services (No service)		0.7	38 [‡]	0.008	0.710 [‡]	0.005	0.715 [‡]	0.005	
162	to ser	vices				C	onclusion	and	furth	er c	Juestic	ns				
1107	Trt .	Services	Distr. of efficiency term	Mean	Min Ma	lax W	/e could no	t see	any re	latio	onship	betwe	en an	d techi	nical	
)	0	No service	Normal/Truncated normal	0.72	0.16 0.8	88 ef	fficiency of	shee	p and	goat	: produ	ction	and ac	cess to	o the	
	1	Agri oxtoncion	Exponential	0.72	0.16 0.8	88 Tr	iree key ser	rvices	; I.e, <i>F</i>	Agrie	cultural	exter		on shee	ep and	
	Ŧ	Agii. extension	Exponential	0.71	0.34 0.8	89 in	Jat, Rural C	realt	TOT SNE	ep ed a	and go	at, and	a wari molo	ket		
	2	Market info on s	Normal/Truncated normal	0.70	0.38 0.8	86 ^{III} 86 •	Notwithst	andin	eep al	iu g Doss	sible m	easure	ement	errors	both	
	3	Credit for shoat	Normal/Truncated normal	0.70	0.38 0.8	84	in inputs a	nd ou	itputs,	it is	impor	tant to	o ask a	t least	three	
	_		Exponential	0.72	0.47 0.8	84	questions:									
	4	Extension and mkt info	Normal/Truncated normal Exponential	0.71 0.71	0.02 0.8	86 86	Are	the se	ervices	pro	operly c	lesign	ed?			
	5	Extension and credit	redit Normal/Truncated normal 0		0.52 0.8	86	Are	they	being	deliv	vered t	ne rigł	nt way	?		
ons.	C	NALL info and supplie	Exponential	0.71	0.52 0.8	86	Are	the te	echnol	ogie	es provi	ded to	o farm	ers thr	ough	
u ε)	Ь	wikt into and credit	Normal/Truncated normal 0.72 0.5 Exponential 0.72 0.7			81	thes	se ser	vices p	rop	erly de	signed	d and t	argete	d?	
Four	7	All services	Normal/Truncated normal	0.70	0.27 0.8	81					ılı	RESEARCH		CORISING	-	
ed.			Exponential	0.71 0.27		81		R				PROGRAM	UN	A Star		
		Total	Normal/Truncated normal	0.71	0.02 0.8	89		71/	UL		CGIAR	and Ma	ions, irkets			
			Exponential	0./1	0.02 0.8	89	Science for Bette	er Livelihoc	ds in Dry Are	as		Led	by IFPRI	Ţ		









