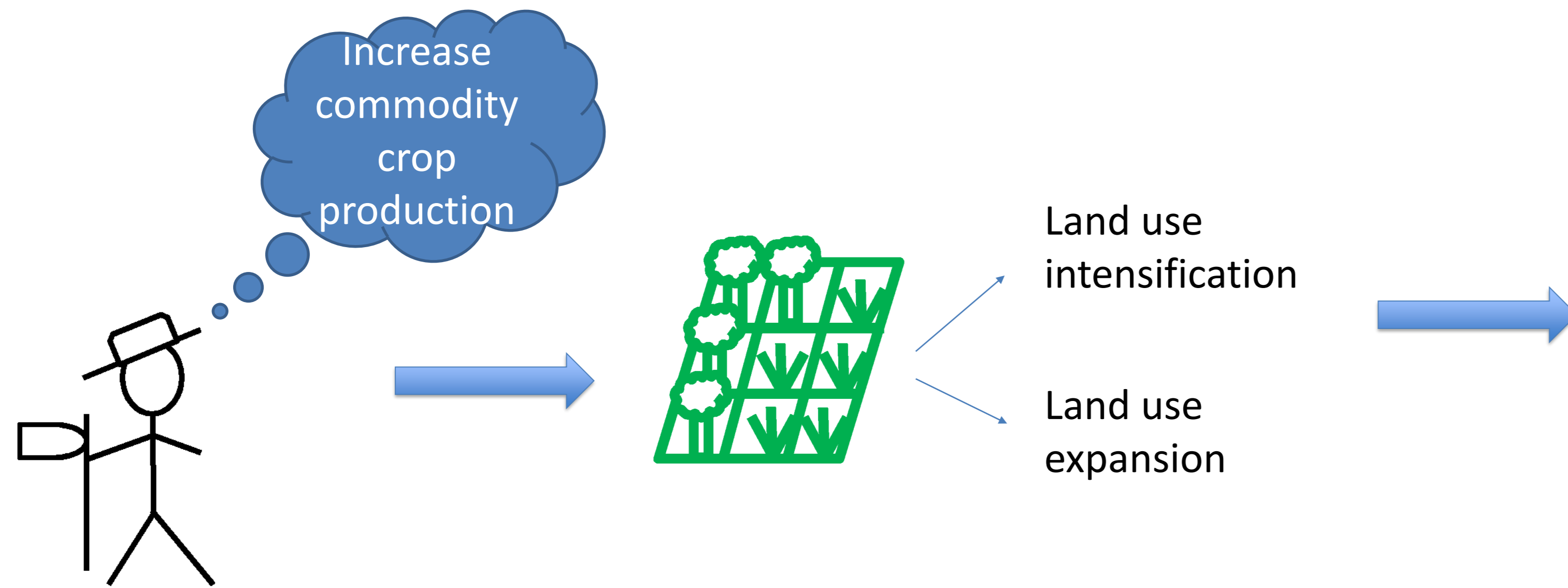


INTRODUCTION



HYPOTHESES

Hypothesis	Dependent variable	Independent variable	Sign
Induced intensification	Yield	Cropland	Negative
		Rural population density	Positive
Land Sparing Rebound Effect	Cropland area	TFP	Negative / Positive
		Yield	Negative / Positive

Hypothesis 1: Cropland intensity will increase if local pressure on land increases (induced intensification).
Hypothesis 2: Staples crops exhibit land sparing with intensification.
Hypothesis 3: Intensification of flex and leisure crops is more likely to result in a rebound effect.
Hypothesis 4: Intensification occurring through increase in TFP, which influences competitiveness, is more likely to result in a rebound-effect.

METHODOLOGY: Cointegration model and causality tests

LONG RUN MODEL

$$\begin{aligned} \text{LogYield}_{i,t} &= \alpha_{1i} + \beta_1 \text{LogCropland}_{i,t} + \beta_2 \text{TFP}_{i,t} + \beta_3 \text{LogGDPcapita}_{i,t} + \beta_4 \text{LogRPDdensity}_{i,t} + \mu_{i,t} \\ \text{LogCropland}_{i,t} &= \alpha_{2i} + \beta_1 \text{LogYield}_{i,t} + \beta_2 \text{TFP}_{i,t} + \beta_3 \text{LogGDPcapita}_{i,t} + \beta_4 \text{LogRPDdensity}_{i,t} + \mu_{i,t} \end{aligned}$$

SHORT RUN MODEL

$$\begin{aligned} \Delta \text{LogYield}_{i,t} &= \beta_1 \Delta \text{LogCropland}_{i,t-1} + \beta_2 \Delta \text{TFP}_{i,t-1} + \beta_3 \Delta \text{LogGDPcapita}_{i,t-1} + \beta_4 \Delta \text{LogRPDdensity}_{i,t-1} + \beta_5 \mu_{i,t-1} + \varepsilon_{i,t} \\ \Delta \text{LogCropland}_{i,t} &= \beta_1 \Delta \text{LogYield}_{i,t-1} + \beta_2 \Delta \text{TFP}_{i,t-1} + \beta_3 \Delta \text{LogGDPcapita}_{i,t-1} + \beta_4 \Delta \text{LogRPDdensity}_{i,t-1} + \beta_5 \mu_{i,t-1} + \varepsilon_{i,t} \end{aligned}$$

RESULTS

Long-run regressions	Yield as dependent variable							Cropland area as dependent variable						
	Low	Middle	High	Wheat	Rice	Coffee	Banana	Low	Middle	High	Wheat	Maize	Coffee	Banana
LogCropland	-0.242	-0.264	-0.0653	-0.111	0.0511	0.0220	-0.217***	-	-	-	-	-	-	-
LogYield	-	-	-	-	-	-	-	-0.151	-0.157	-0.0470	0.138	0.0494	0.0431	-0.384***
TFP	0.890	0.854	1.004	-0.130	0.0147	1.440	0.354***	0.627	0.182	0.210	-0.549	-0.295***	-1.163	0.977***
LogGDPcapita	-0.0363	(-)0.0695	-0.177	0.359	0.0713**	0.0451	0.431***	0.0778	-0.0780	-0.0694	-0.0358	0.341***	1.193	1.029***
LogRPDdensity	-0.00598	0.234	0.335	0.225	-0.138**	0.394	0.735***	-0.149	0.0633	0.108	0.422	-0.301***	0.492	1.191***
N	957	3032	1415	719	523	606	1010	957	3032	1415	719	523	606	1010

Short-run regressions	Yield as dependent variable							Cropland area as dependent variable						
	Low	Middle	High	Wheat	Maize	Coffee	Banana	Low	Middle	High	Wheat	Maize	Coffee	Banana
LΔ.LogCropland	0.106	0.0829	-0.154**	-0.158***	-0.123**	-0.0171	0.0552*	-	-	-	-	-	-	-
LΔ.LogYield	-	-	-	-	-	-	-	-0.00566	0.0216***	-0.0104	-0.0891***	-0.0572*	-0.0321	0.0960***
LΔ.TFP	0.174*	0.0568	0.180*	0.483**	-0.388	-0.261	0.0763	0.155***	0.0896***	0.0129	-0.336**	0.438*	0.481**	0.584***
LΔ.LogGDPcapita	-0.0834	0.0549	0.119	0.334**	0.451**	0.505**	-0.0326	0.0322*	0.00663	-0.0335	0.167	0.0826	0.0321	-0.0223
LΔ.LogRPDdensity	0.251	-0.388*	-0.131	0.350	-1,151	2.397**	0.151	0.504***	0.193**	-0.0689	0.565	0.801	0.389	0.459
L.Residuals	-0.236***	-0.186***	-0.155***	-0.665***	-0.620***	-0.410***	-0.0952***	-	-	-	-0.205***	-0.288***	-0.131***	-0.0732***
N	935	2962	1384	703	512	593	989	935	2962	1384	703	512	593	989

Note: Significance at 1% (***) and 5% (**)

CONCLUSIONS

- There exist a cointegration relationship between the variables of the cointegration model (significant "L.Residuals")
- Validation of Hypothesis 1 (induced intensification) for: main cereals and labor intensive crops (coffee&cocoa)
- Validation of Hypothesis 2 for Wheat and an aggregate of Rice, Wheat and Maize together.
- Validation of Hypothesis 3 for low and middle income countries & Banana (and others crops with high price elasticity of demand)
- Validation of Hypothesis 4 for Coffee and Bananas

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