

The Impact of Population Density on African Agriculture and Livelihoods: The Case of Malawi

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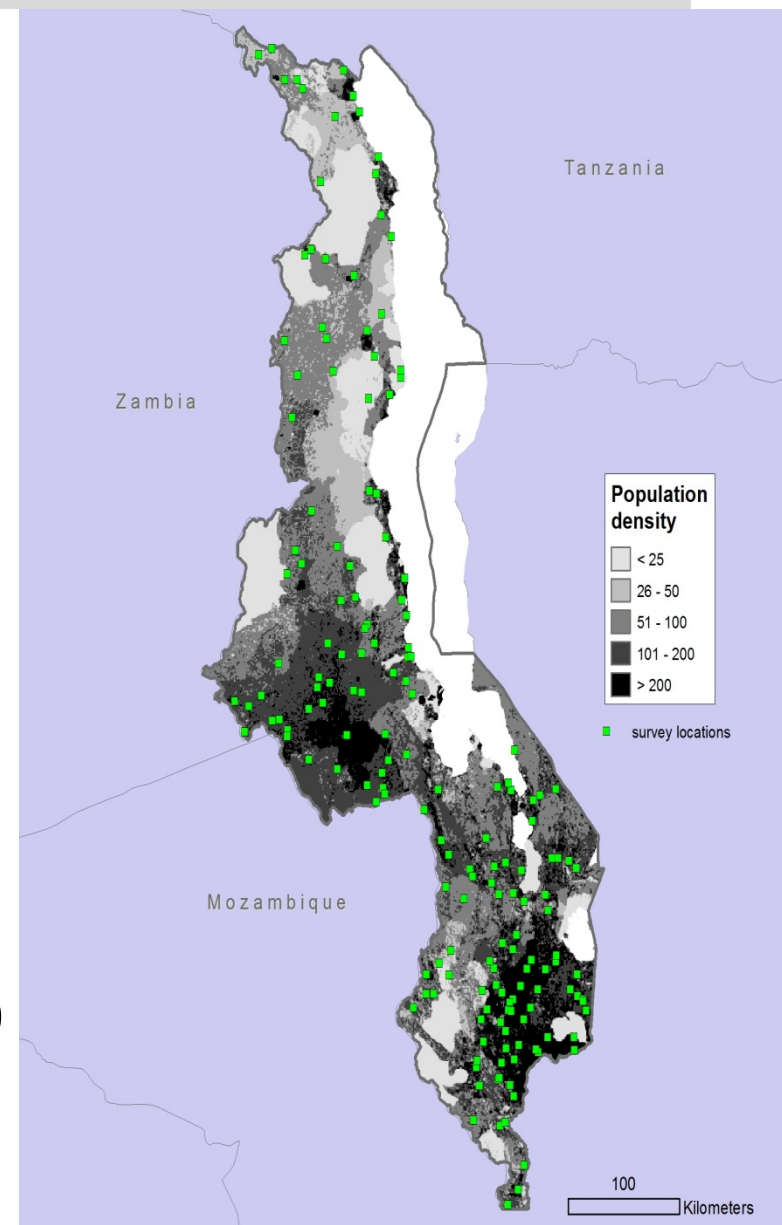
Jordan Chamberlin

Presentation on Workshop on Emerging Land Constraints in sub-Saharan African at the International Food Policy Research Institute, Washington D.C.,
April 12, 2013

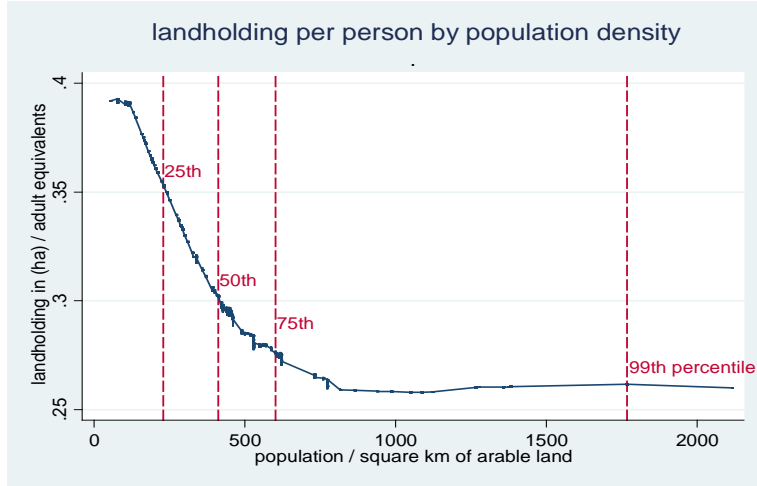


Three waves of Nationally Representative HH-level data

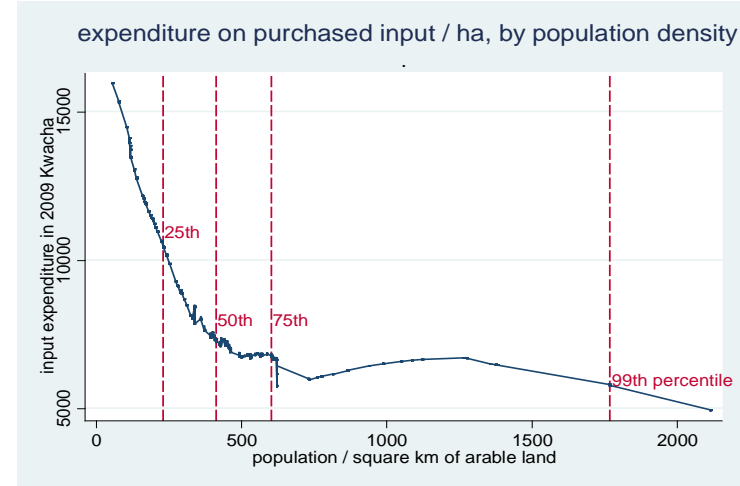
- Wave 1: 2002/03, 2003/04; IHS2
 - Wave 2: 2006/07; AISS1
 - Wave 3: 2008/09; AISS2
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- In total 1,375 farmers surveyed in all three waves
 - Population density measured as persons/km² of arable land using GRUMP.
 - Population density measure is 3 wave average
 - Cross sectional variation through 99 enumeration area



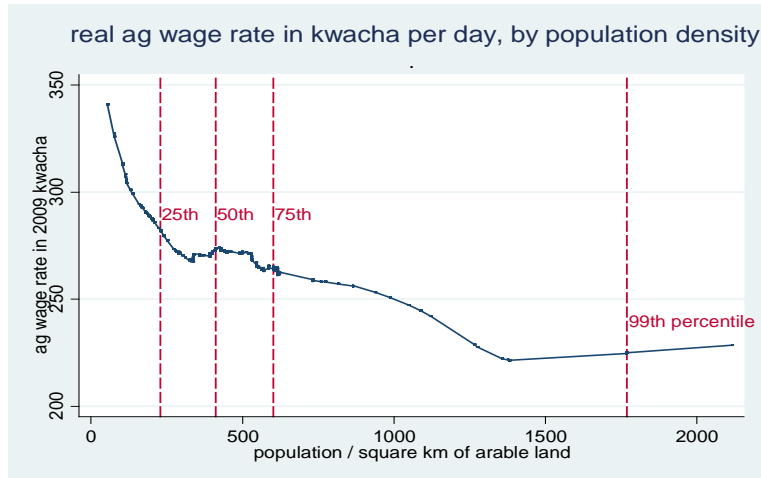
Household Landholding in Hectares per Adult Equivalent by Population Density



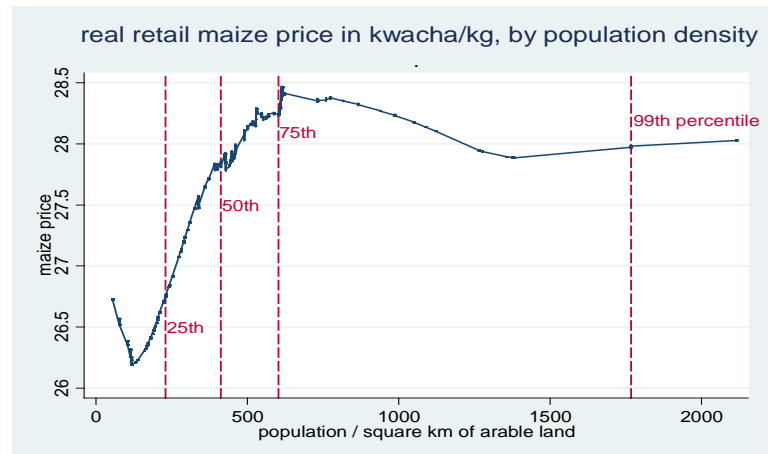
Expenditure on purchased input per Hectare by Population Density



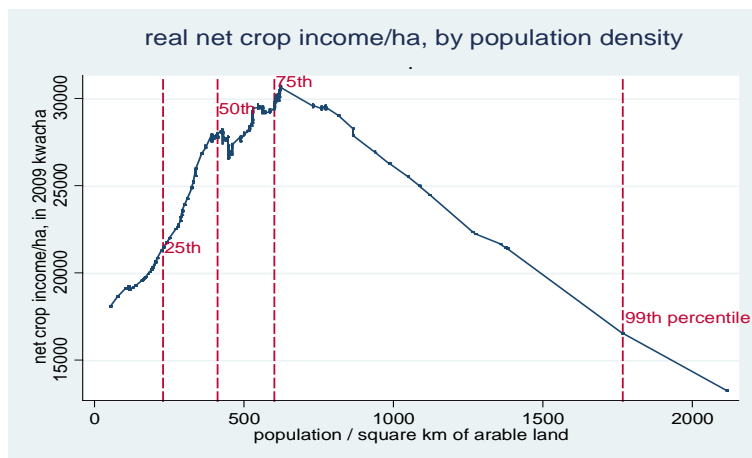
Real Agricultural Wage rate (in Kwacha per day)



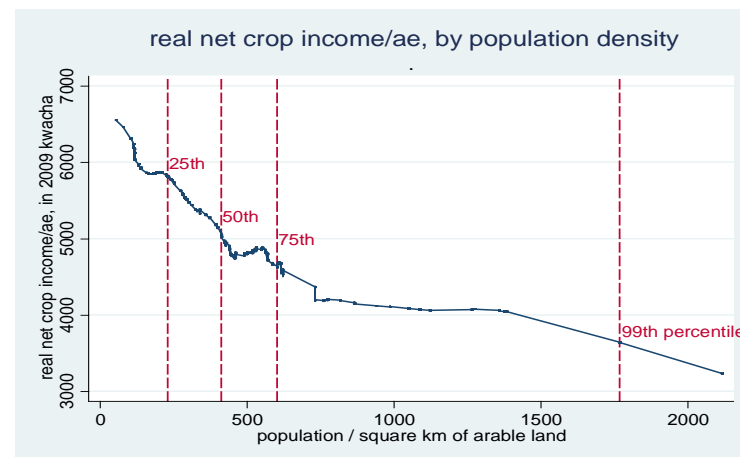
Real Retail Harvest Season Maize Prices in Kwacha/kg, by Population Density



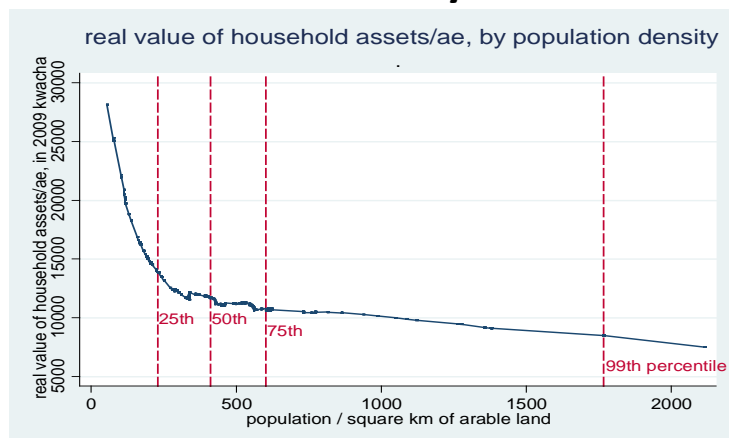
Net crop income per hectare owned, by Population Density



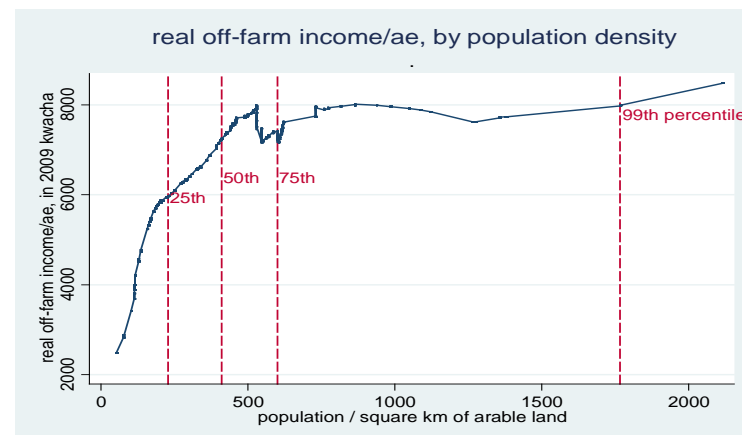
Net-crop income per adult equivalent (in '000 kwacha) by Population Density



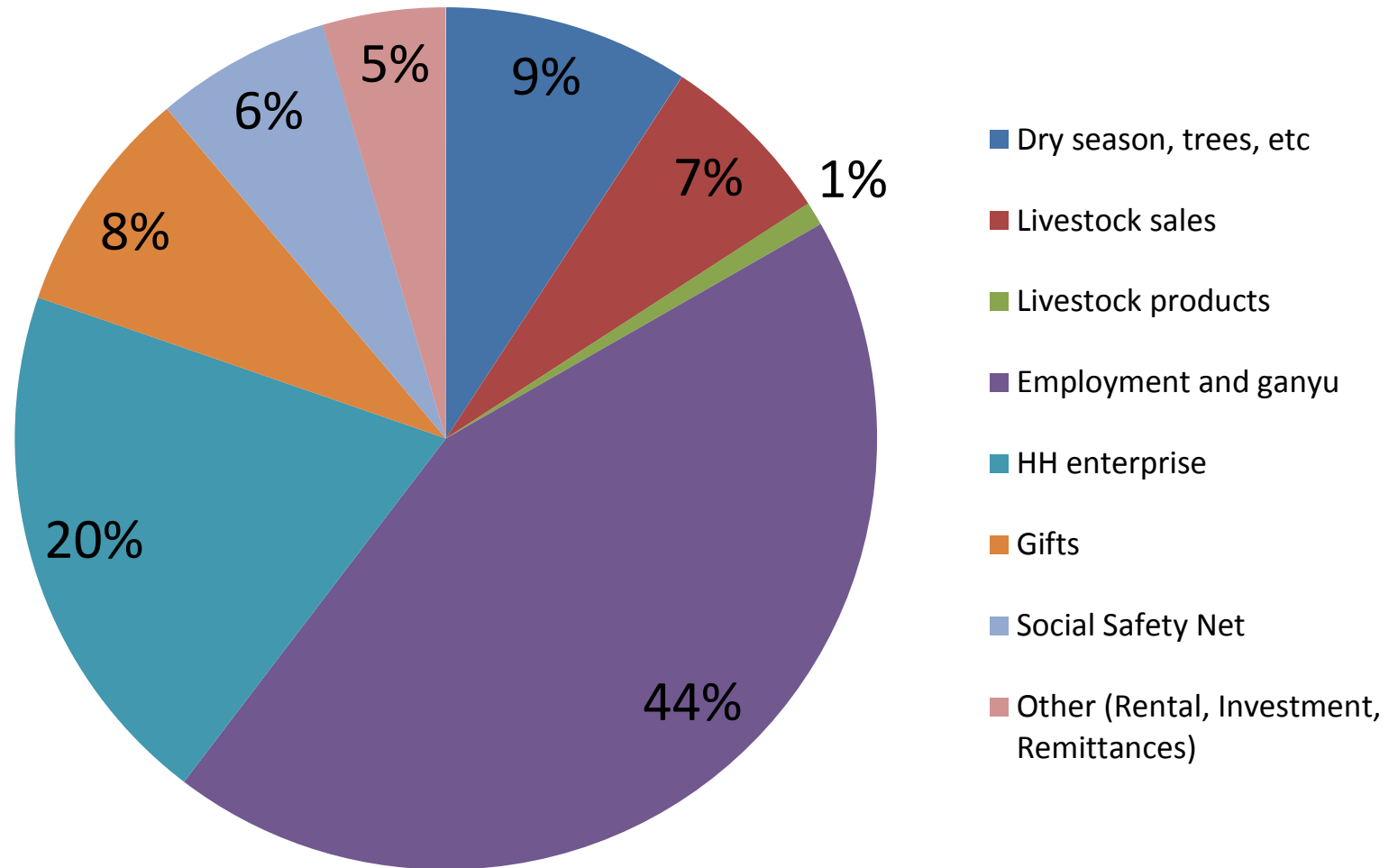
Value of Household Livestock and Durable Assets per adult equivalent, by Population Density



Off-farm income per adult equivalent (in '000 kwacha) by Population Density



Share of Income from Sources Other than Rainy-Season Crops during the 2008/09 season



Descriptive statistics suggest households being “pushed” into off-farm activities.

Econometric Results

Covariates	(1) Landholding	(2) Log Wage Rate	(3) Log Retail Maize Price
Population Density *100	-0.048****	0.12*	0.005***
Population Density ² *100	1.43E-05***	-5.31E-06*	-1.47E-06
Age of HH head	0.010**	-	-
Distance to main district market, in km	0.004***	-7.34E-04***	3.13E-04***
Population Density Turning Point	1,695	442	17,006

*, **, ***, **** denotes that corresponding coefficients are statistically significant at the 15%, 10%, 5%, 1% levels respectively; other covariates not shown

Econometric Results (Continued)

	(1)	(2)	(3)	(4)	(5)
	Fertilizer Demand	Hybrid Maize Area	Maize Production	Farm Income	Off-farm Income
Pop. Density *100	0.29	-9.90E-03	-7.76	14**	9
Pop. Density ² *100	-5.00E-04	2.75E-06	4.47E-03	-0.01**	-2.42E-03
Landholding	42.69***	0.22***	203***	7,782***	-4,535
Assets	3.65E-05***	5.23E-09	1.91E-04***	0.01***	8.75E-03
I. Direct effect: APE of pop density + pop density² *100					
	(-0.212)	(-0.007*)	(-3.30)	(646.15*)	646.62
II. Indirect Effect: APE of population density through landholding, wages, and mz price *100					
	(-1.47**)	(-0.008***)	(-7.00***)	(-268.66***)	(156.68)
III. Total Effect: ATPE, direct + indirect *100					
	(-1.68)	(-0.015***)	(-10.30*)	(377.49)	803.30

*, **, *** denotes that corresponding coefficients are statistically significant at the, 10%, 5%, 1% levels respectively; other covariates not shown

Conclusions

- Higher population density contributing to smaller landholding *ceteris paribus*.
 - Consequences of small farm size make it difficult for households to intensify and increase income in the face of high population density.
- Population density drives up ag wages initially and then causes them to decline (around 50th percentile of population density distribution).
- Population density puts slight upward pressure on maize prices.
 - Small effect could be due to relative market integration in Malawi.

Conclusions continued

- Main effects of population density on intensification and well-being seem to be working through indirect channels.
 - Smaller land, lower wages, higher prices make intensification harder.
- Some evidence that direct effects may increase farm income.
 - Increases market opportunities, and decreased transactions costs.
- Evidence that farmers getting pushed into off-farm work in areas of high population density.
- Households with more land and assets able to protect themselves against the negative effects of high population density.

Thanks for your time



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