



Université de Kara



Climate Change and Land Degradation in the Savana Region of Togo: What are the Available Useful Adaptation Options?

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Outlines



- Motivation

- Analytical Approach

- Results and discussions

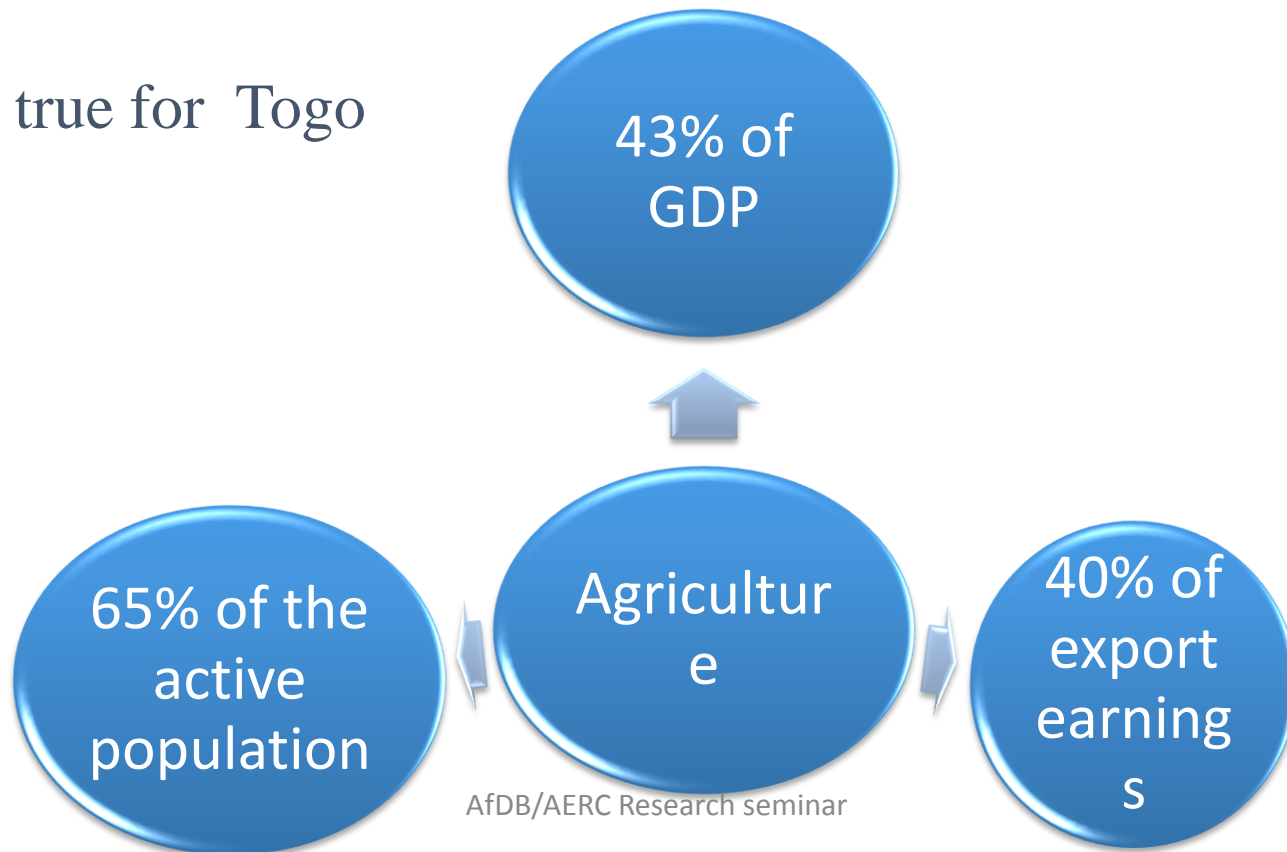
- Concluding remarks

Motivation---*climate change is a reality*

.....*Some Facts*

- ❑ Development stakeholders are convinced that Social and economic development are closely associated with agricultural performances in developing countries (World Bank, BAD, etc.)

- ❑ This is true for Togo

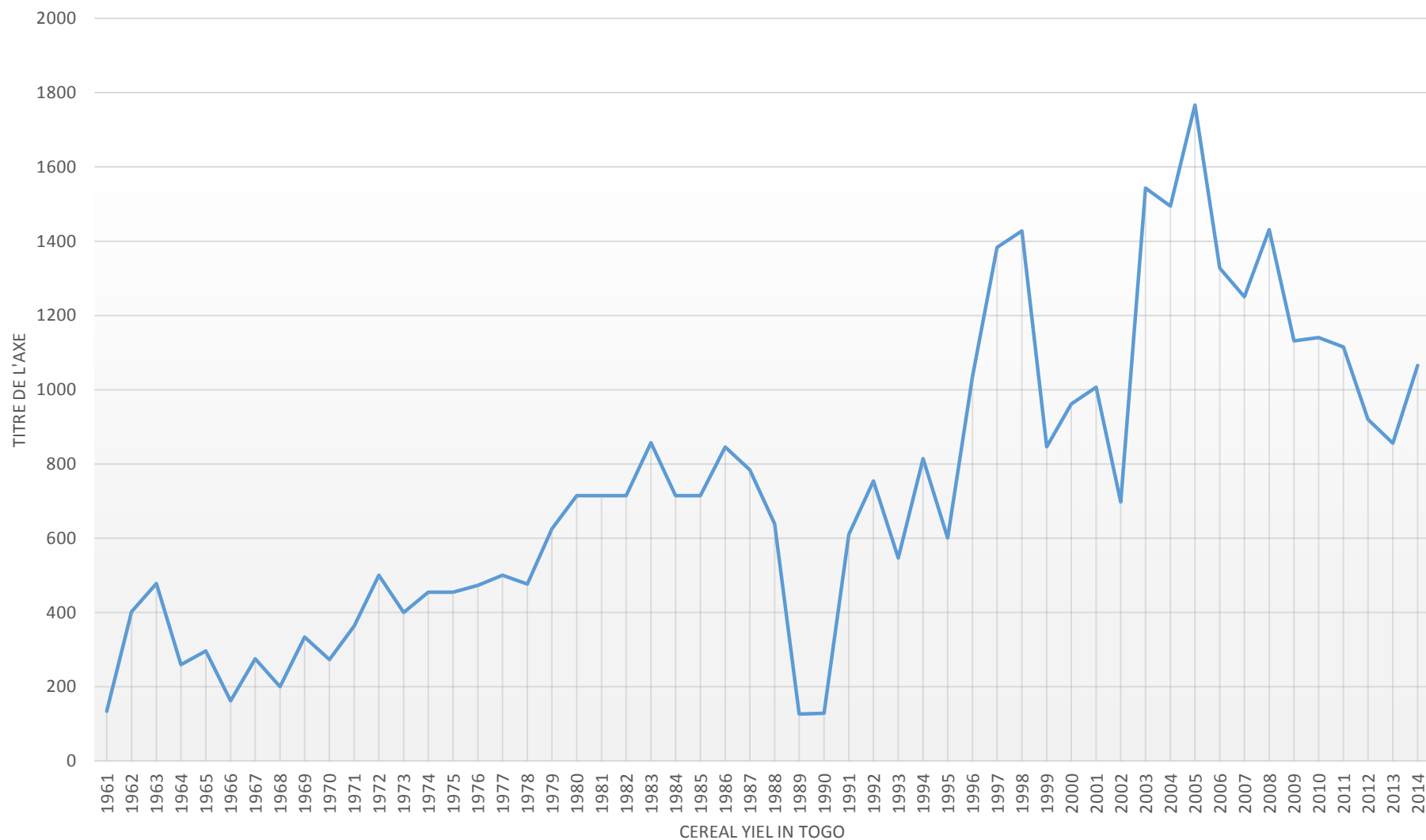


- But.....the performance of the country in terms of agricultural productivity has been almost stagnating for a long period,

.....and despite the government efforts in the recent decades, it has only increased moderately these last years.

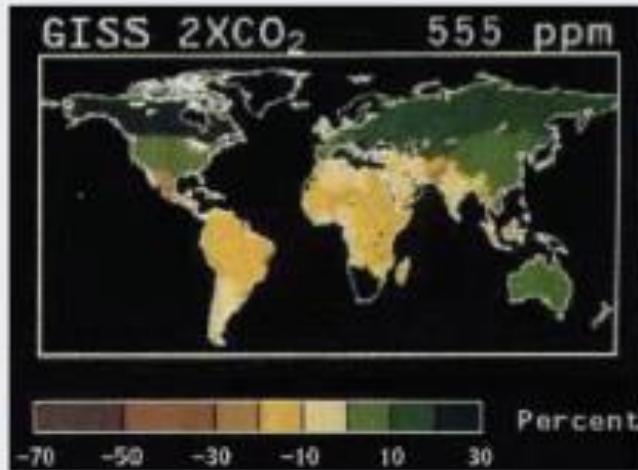
- For instance, on average crop yield in Togo was only 1.1 ton per hectare in 2013 compare to 16.8 in Asian countries

Cereal yield evolution in Togo between 1961-2014



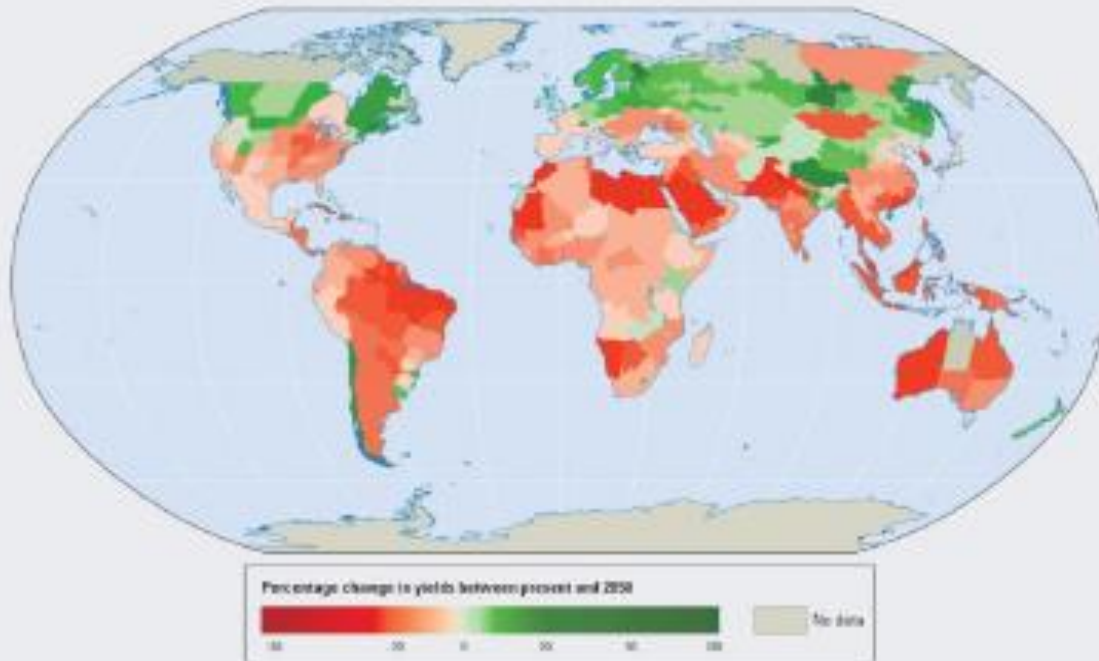
- ❑ The role of climate change in this poor performance is well established by the scientific community (IPCC) and well known by the general public.
- ❑ Indeed, the projected climate change land degradation in terms of agricultural productivity loss is alarming particularly in Africa (IPCC, 2007)

There is a robust climate change impacts estimates at global scale



1994 assessment of the impacts of climate change on the productivity of 4 food crops

Macmillan Publishers Ltd
C Rosenzweig and M Parry
Nature 367, 133-138 1994



2010 assessment of the impacts of climate change on the productivity of 11 food crops

World Bank Publishers
World bank Development report 2010
<http://wdronline.worldbank.org/>

- ❑ These uncomfortable prospects highlight the crucial role adaptation has to play in the progress towards a world without hunger.

- ❑ Farmers have always and will continue to adapt to the changing climate.

- ❑ However, it is unclear whether they are able to identify practices and options that are appropriate to respond to climate change as the required adjustments may fall beyond their range of experience (Seo et al., 2010).

- ❑ The implication of this is the possibility of maladaptation resulting in transitional losses of unknown duration (Di Falco et al, 2011)

- ❑ Thus, determining the productive implications of adaptation to climate change is therefore crucial.

- ❑ It helps understand how a set of strategies implemented by a farmer (*e.g., irrigation, low fertilizer use, soil conservation techniques, etc.*) in response to changes in environmental conditions affect farm income from cropping and livestock

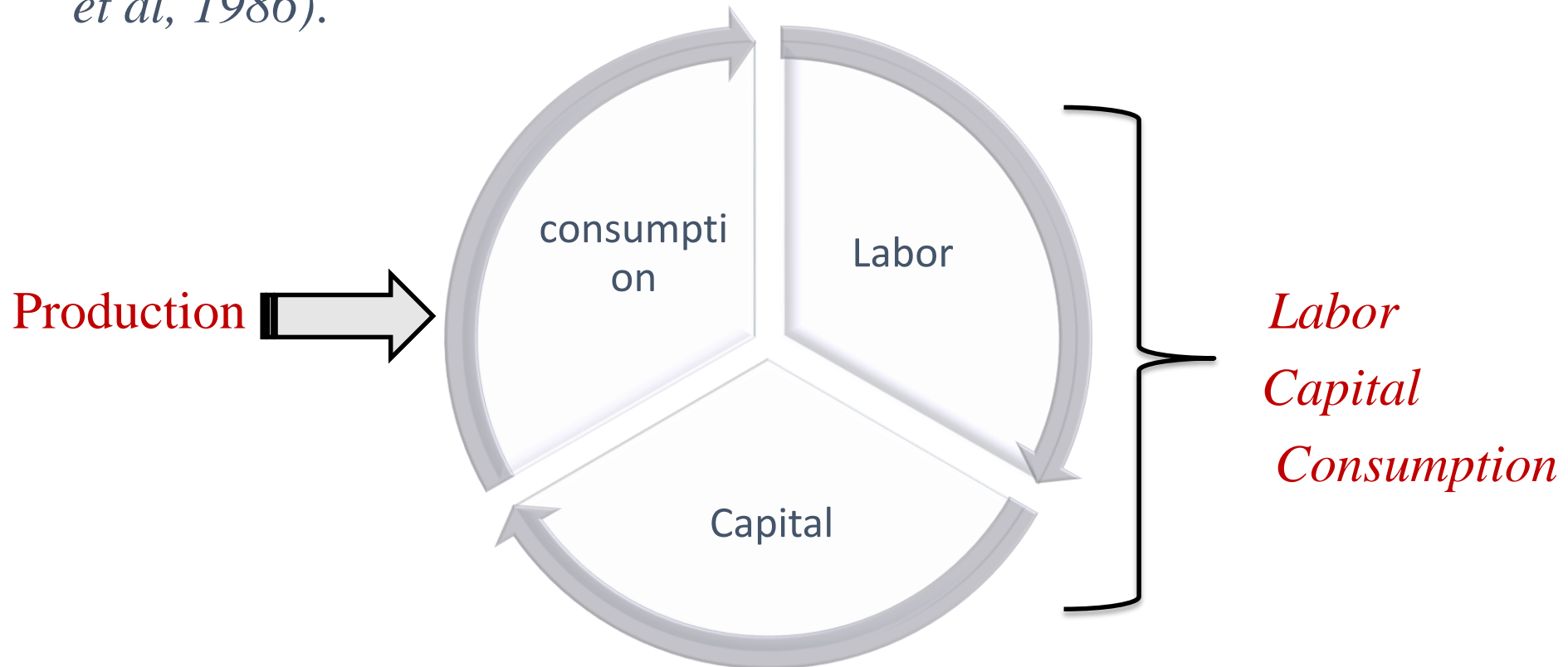
- ❑ This is central if adaptation strategies need to be put in place

Research Question

- What is the impact of private adaptation strategies to climate change on households' income from farming and livestock for adapters?

Analytical approach

- Our analysis is based on Agricultural Household Model framework
- The model assumes that in less developed countries, farmers make joint decisions over food consumption, labour and production (*Singh et al, 1986*).



Empirical Approach

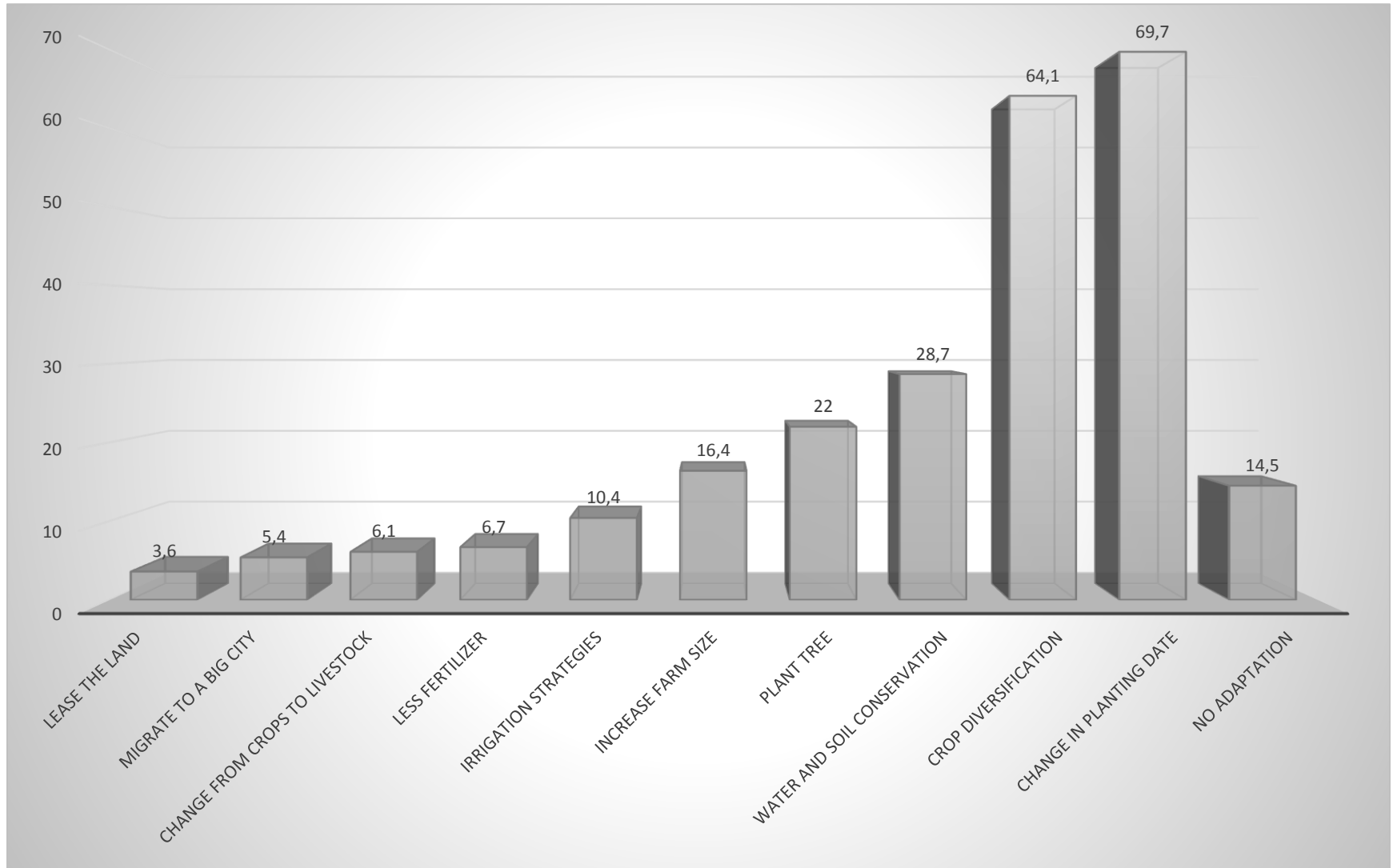
- ❑ Under the previous theoretical framework, we used a bio-economic model for the empirical approach.
- ❑ The model consists in maximizing the net farm income from cropping and livestock under a set of labor, land, consumption, and risk constraints.

Data sources

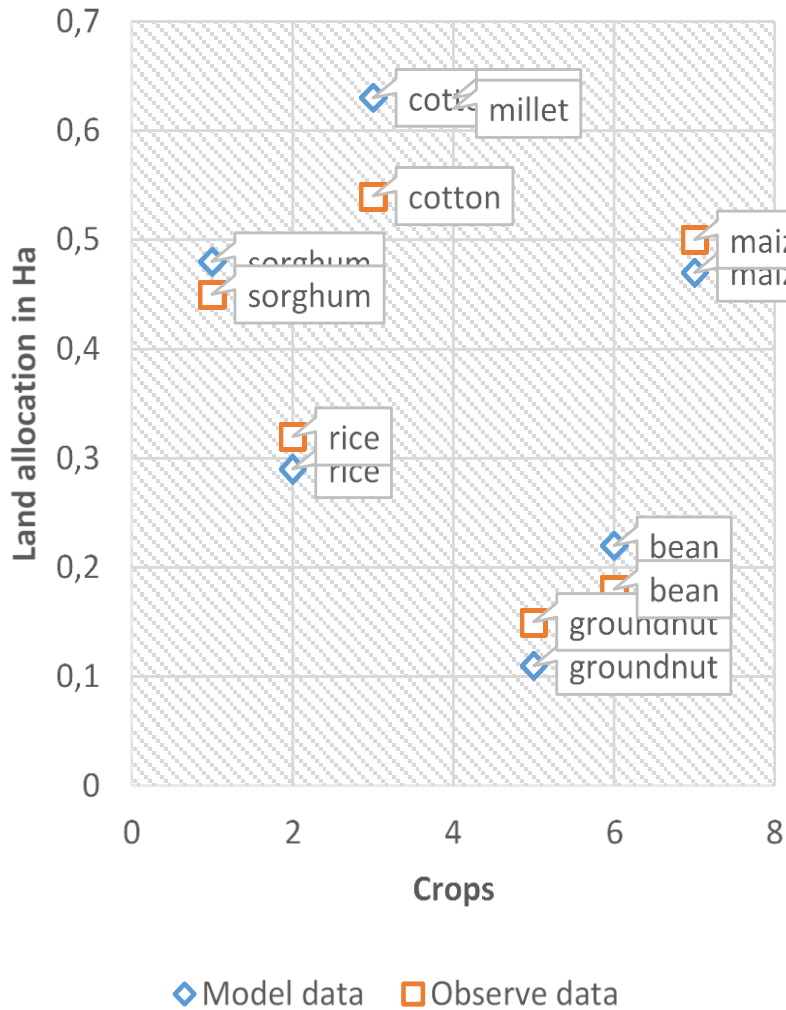
We used data from farm household survey collected in 2013 in the Savanes region of Togo on 450 farm households as part of our PhD.

RESULTS AND DISCUSSIONS

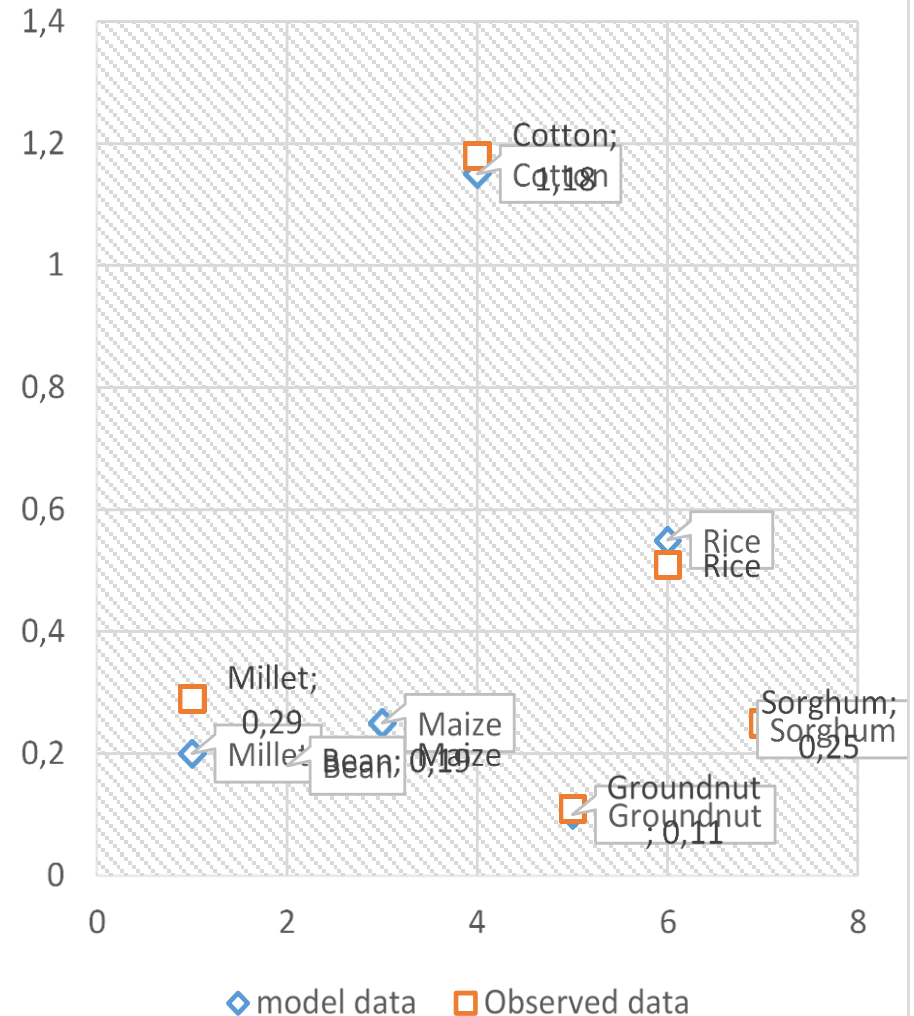
Some statistics



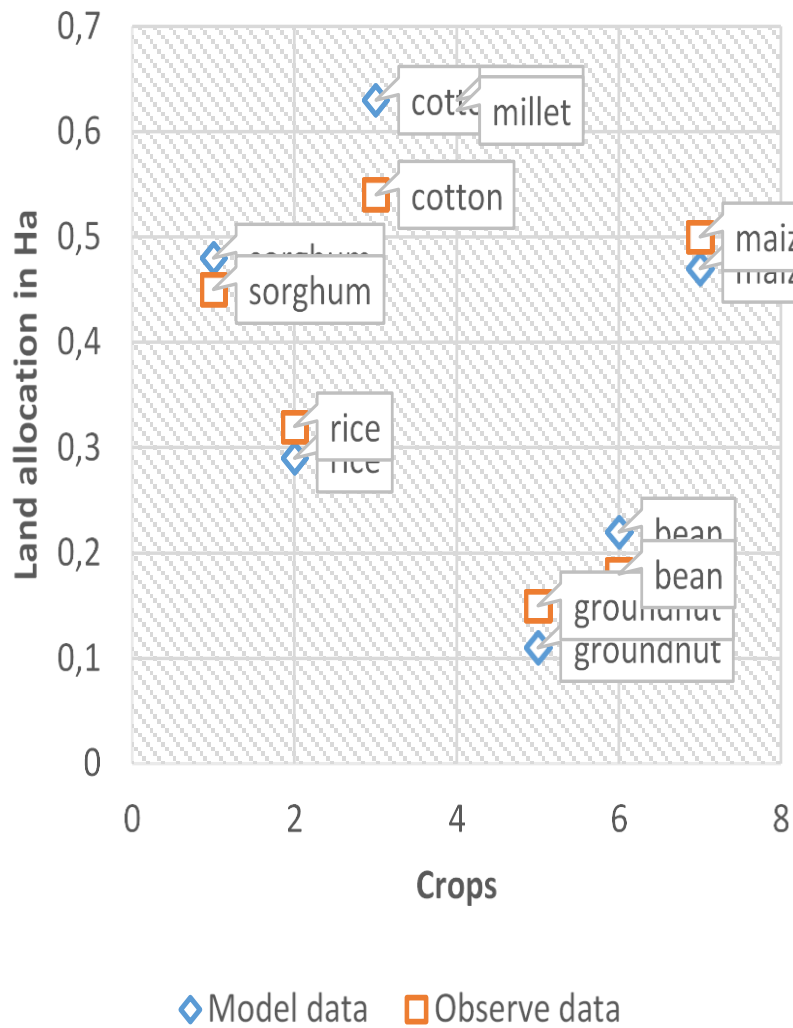
Model calibration



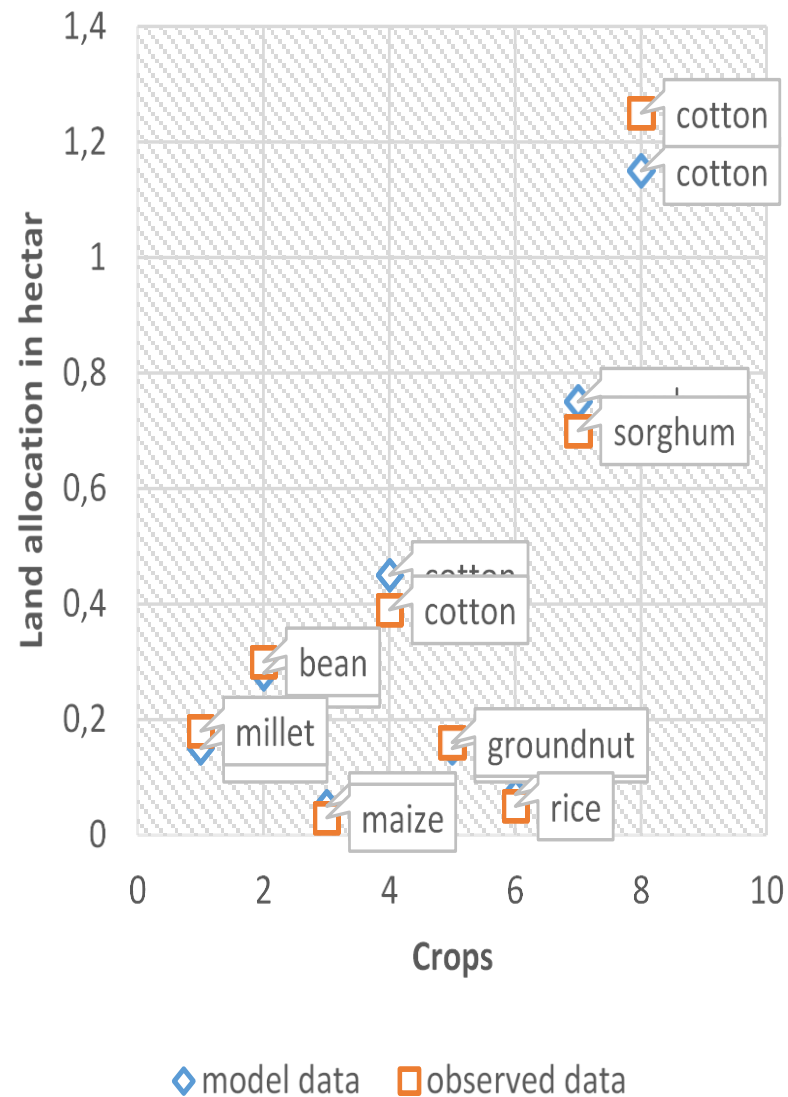
Calibration of the bio-economic model for cluster 1



Calibration of the bio-economic model for cluster 2



Calibration of the bio-economic model for cluster 3



Calibration of the bio-economic model for cluster 1

Strategies simulated

- ❑ S0 → Baseline scenario without climate change
- ❑ S1 → Climate change scenario without adaptation
- ❑ S2 → Climate change scenario with irrigation as the only adaptation option
- ❑ S3 → climate change climate change with SWC as the only adaptation strategies
- ❑ S4 → climate change with fertilizer cut as the only adaptation option

Scenarios (Sn)	Profits/Benefits (US\$)		Percentage of variation		Residual Impacts	
	<i>Wealthier farmers (cluster 2), n=8</i>	<i>Poor farmers (cluster 4), n=303</i>	<i>Wealthier farmers (cluster 2)</i>	<i>Poor farmers (cluster 4)</i>	<i>Wealthier farmers (cluster 2)</i>	<i>Poor farmers (cluster 4)</i>
S0	710.54	582.34	-	-	-	-
S1	451.45	335.23	-36.46%	-42.47%	-36.46%	-42.47%
S2	693.82	487.45	+32.89%	+27.43%	-3.57%	-16.76%
S3	549.08	397.00	+ 12.94%	+ 18.34%	-24.19%	-24.54%
S4	379.86	268.16	-10.78%	12.09%	-46.99%	-54.78
	Cluster 1 (n=90)	Cluster 3 (n=40)	Cluster 1	Cluster 3	Cluster 1	Cluster 3
S0	630.32	588.90	-	-	-	-
S1	355.00	340.23	-43.67%	- 42.22%	-43.67%-	-42.22%
S2	582.17	517.67	+36.04%	+30.13%	-07.64%	-12.09%
S3	486.95	375.76	+20.93%	+06.03%	-22.75%	-36.19%
S4	289.43	269.00	-10.40%	-12.09%	-54.08%	-54.32%

Concluding remarks

This paper:

- Contributes to the assessment of the impact of adaptation to climate change
- Supports the idea that the decision of farm households to adapt might not be rational
- Draws some recommendations on how efficiency can be increased

Policy implications

- ❑ In line with the findings, two types of recommendations can be formulated
- ✓ Policy makers should consider the promotion of irrigation and soil and water conservation techniques as useful strategies in fighting land degradation due to climate change
- ✓ In this process, community-based irrigation approach should be preferred to allow farm households to benefit from economies of scale

THANKS FOR YOUR KIND ATTENTION



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