Climate change impact on rainfed versus irrigated farm systems: does the threshold matter?

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Previous work

Climate Change (CC) has an impact on agriculture

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Agricultural climate response

Agriculture = Man-made adjunct to natural systems

- **Farming systems adapt**

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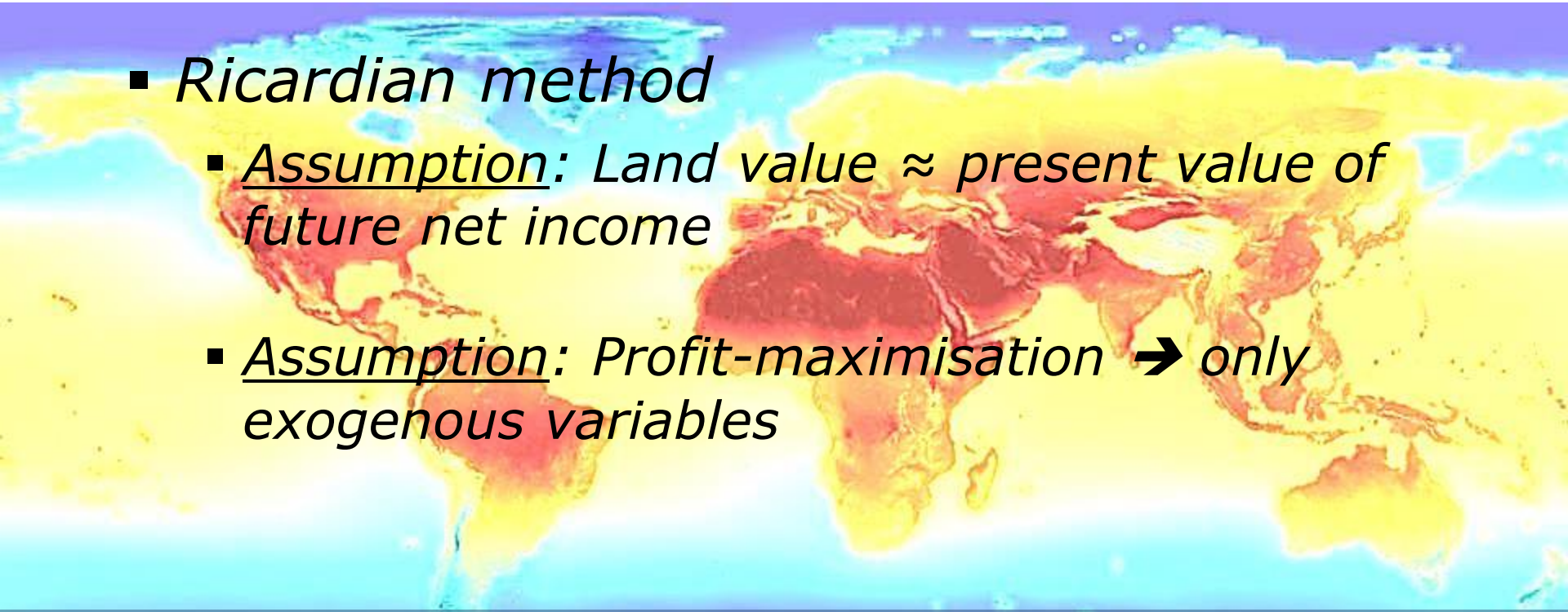
Vanschoenwinkel, Mendelsohn & Van Passel (2016)

Regional climate response depends on adaptive capacity

Methodology: Ricardian cross-sectional analysis

- *How does farm income respond to CC?*



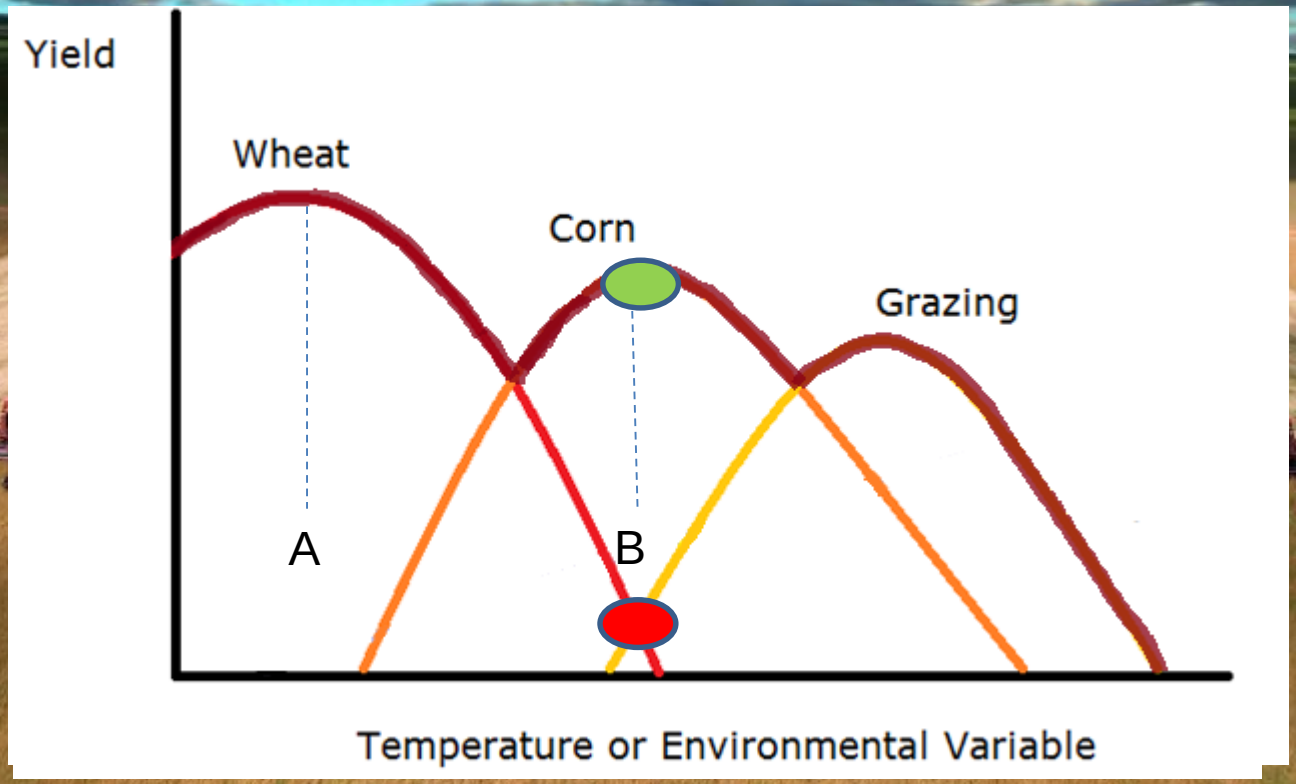
- *Ricardian method*
  - *<u>Assumption</u>: Land value ≈ present value of future net income*
  - *<u>Assumption</u>: Profit-maximisation ➔ only exogenous variables*

$$\textit{Climate response} = \textit{net income}^{*} = \textit{land value} = f(\textit{exogenous factors})$$

Methodology- Ricardian Technique

✓ Takes into account adaptation

Farmers in one location, behave the same as farmers in a 2th location if that location were made to look like the 2th one



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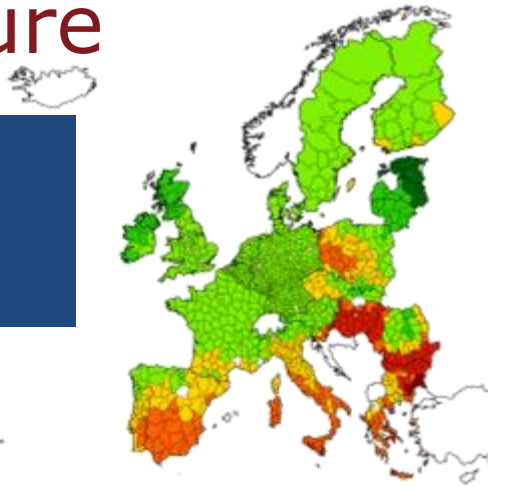
What do we measure?

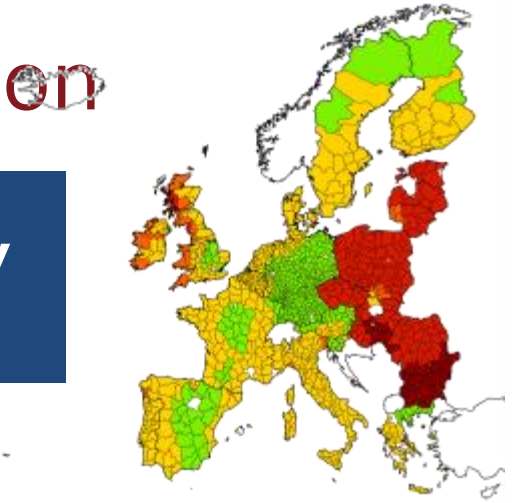
MEt: Marginal Effect of Temperature

If temperature ↑ +1 °C,
what is %Δ landvalue



MEp: Marginal Effect of Precipitation

If precipitation ↑ +1 mm,
what is %Δ landvalue



CC impact on agriculture

Irrigation in the Ricardian model?

$$\boldsymbol{Climate\ response = net\ income^{*} = land\ value = f(exogenous\ factors)}$$

Criticism:

- Cline (1996)
- Schlenker et al. (2006)
- …

Indeed:

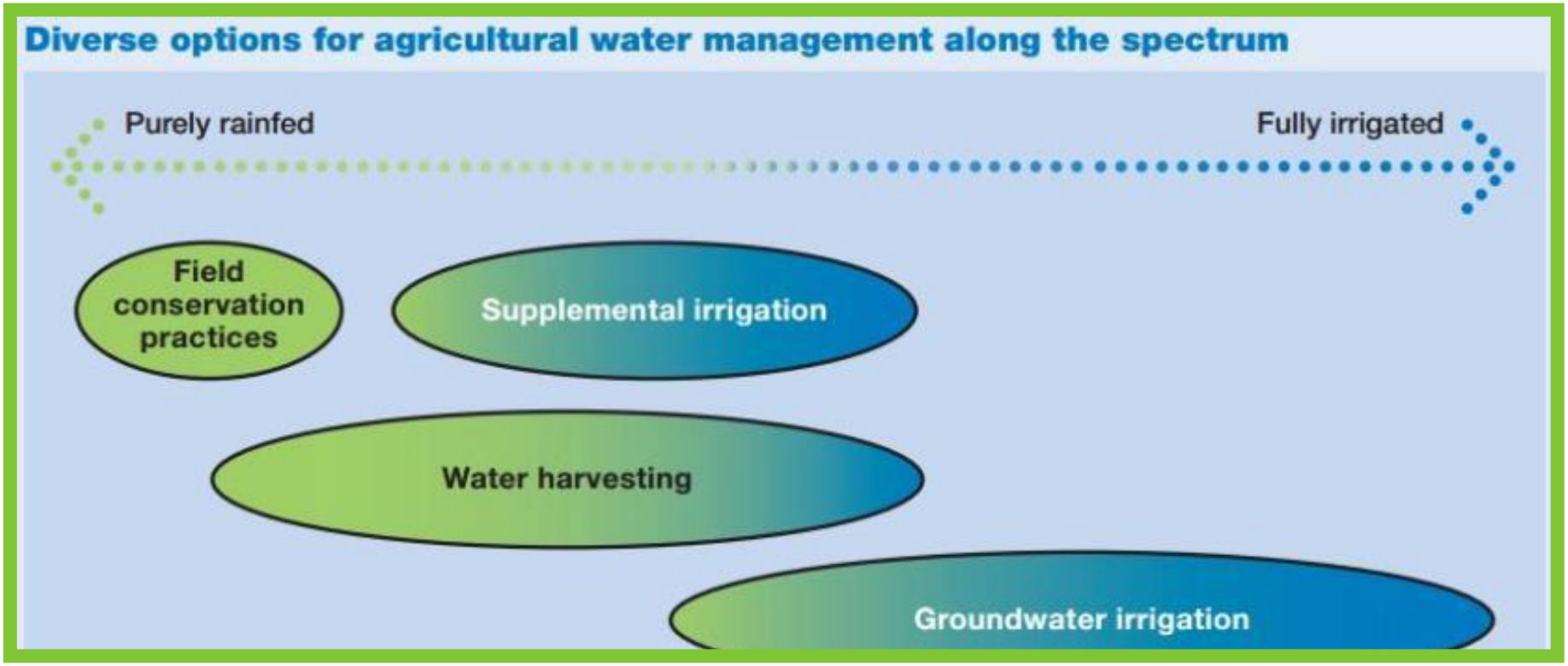
- Irrigation "breaks the link between the growth of a plant and the climate"

Responses to criticism

- Mendelsohn and Dinar (2003) ;
- Kurukulasuriya and Mendelsohn (2006);
- Mendelsohn and Seo (2007) ;
- Seo and Mendelsohn (2008) ;
- Kurukulasuriya et al. (2011)
- …

~~1 = Irrigation~~

~~0 = Rainfed~~



Does this influence research conclusions?

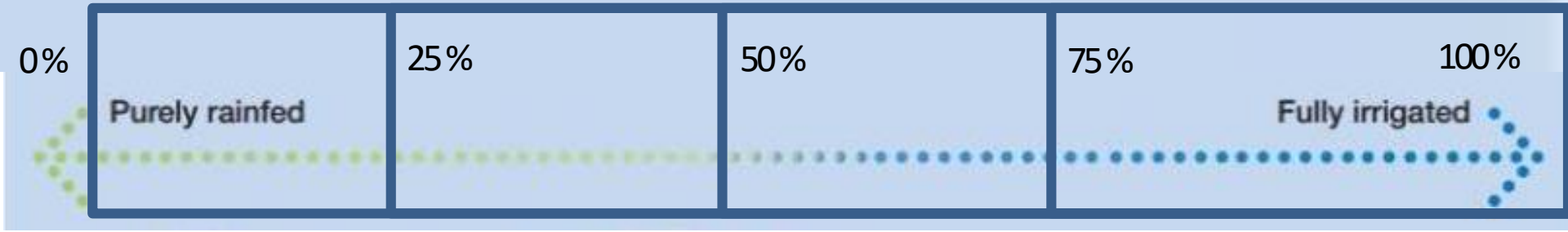
1 = Irrigation

0 = Rainfed

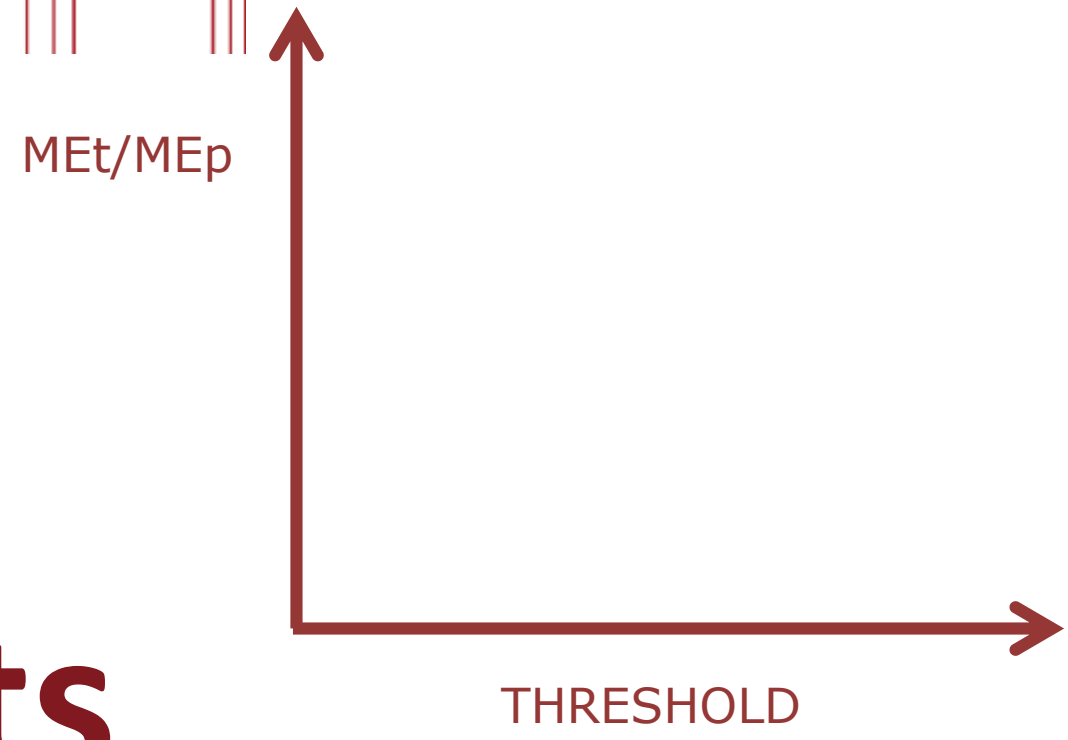
=

Ignoring the spectrum from purely rainfed to irrigation

How do they make their categories?



Would a different threshold change their conclusions?



Results

Determines sample!

Farms that irrigate MORE THAN the threshold

Irrigation = 1

Otherwise

Irrigation = 0

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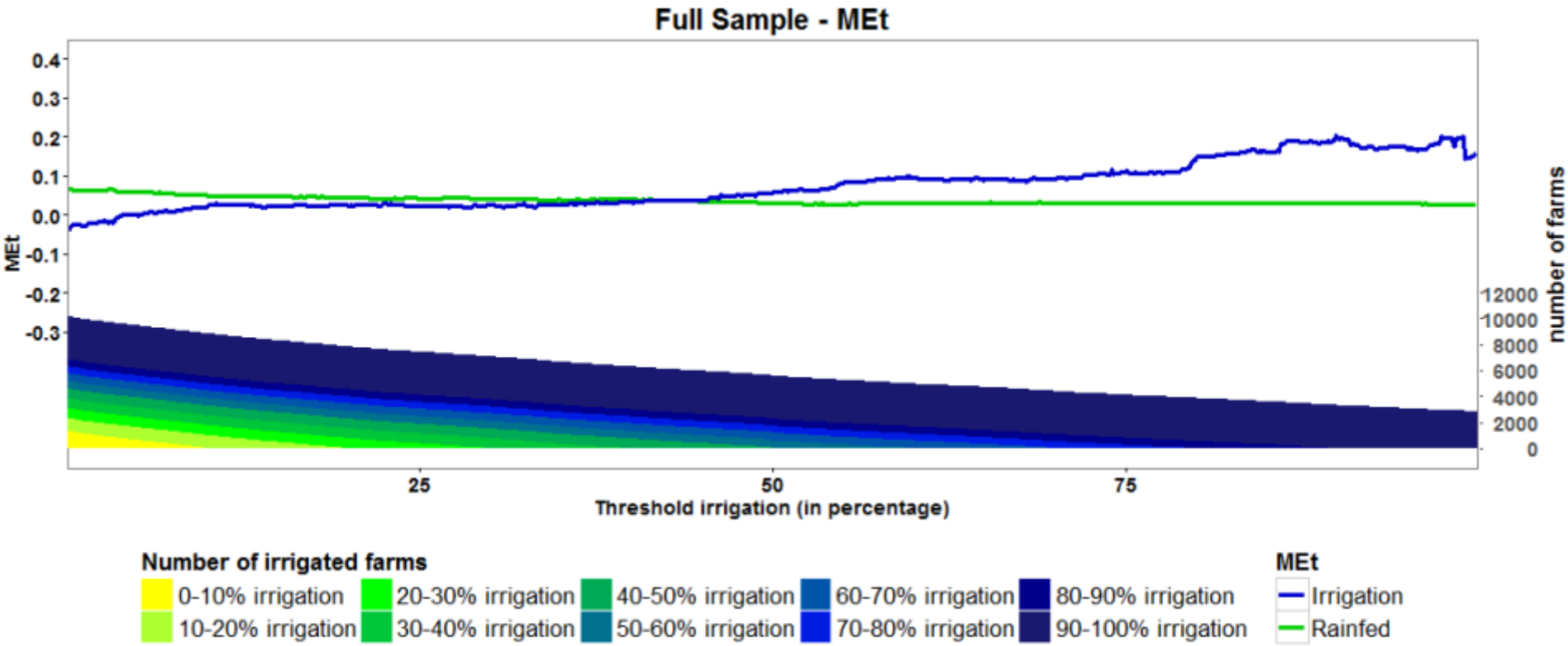
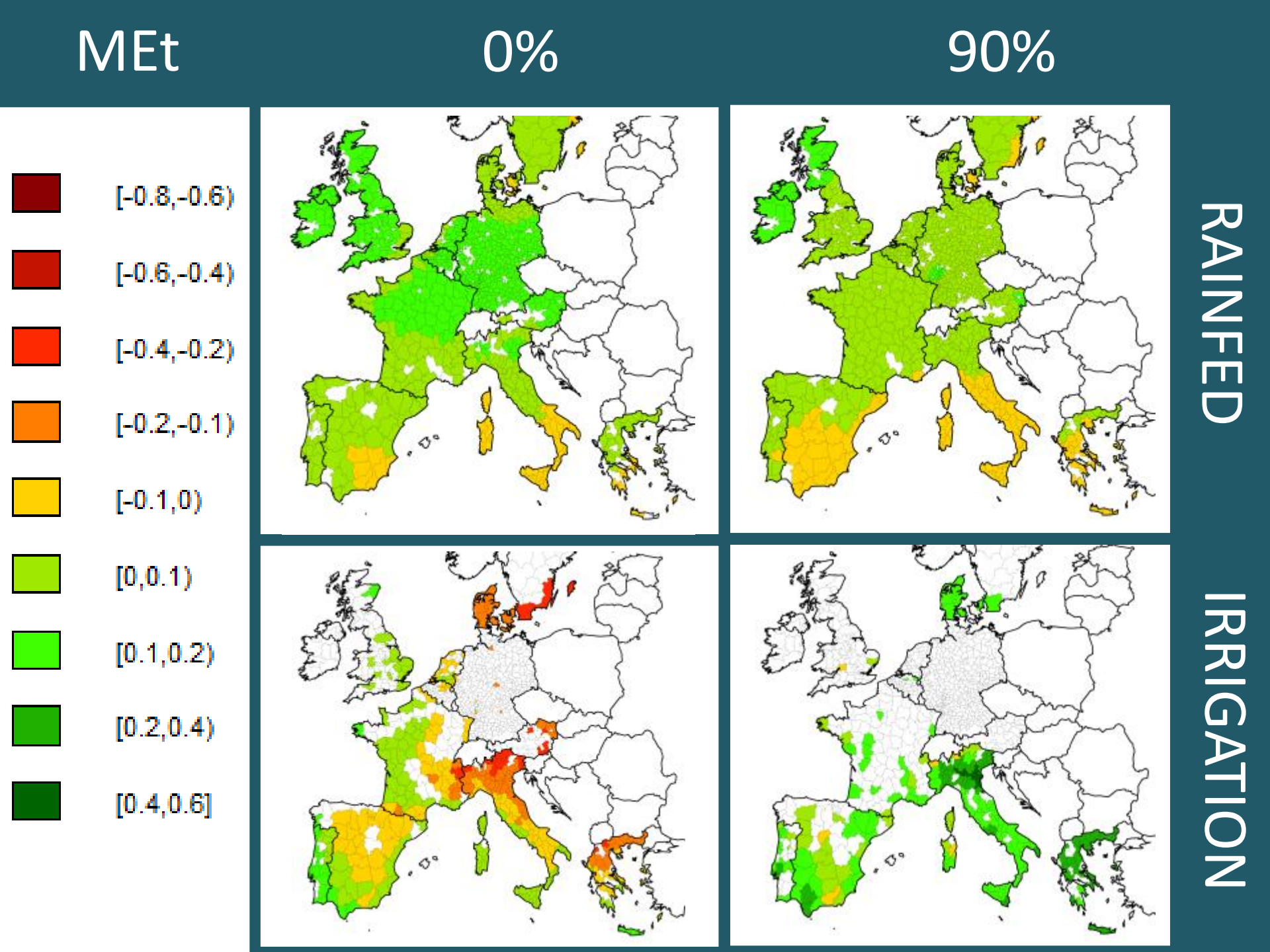
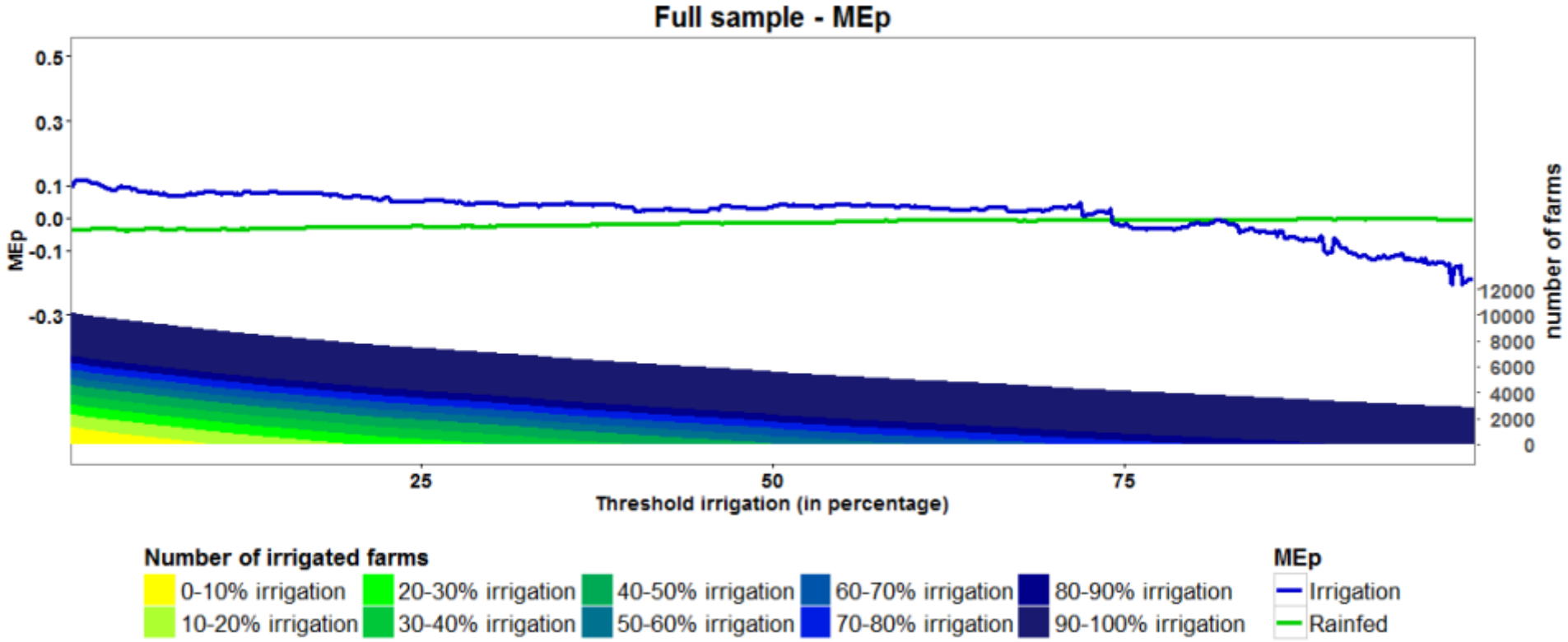
MEt full sample



MEt_irrigation > MEt_rainfed from 44,1% threshold on

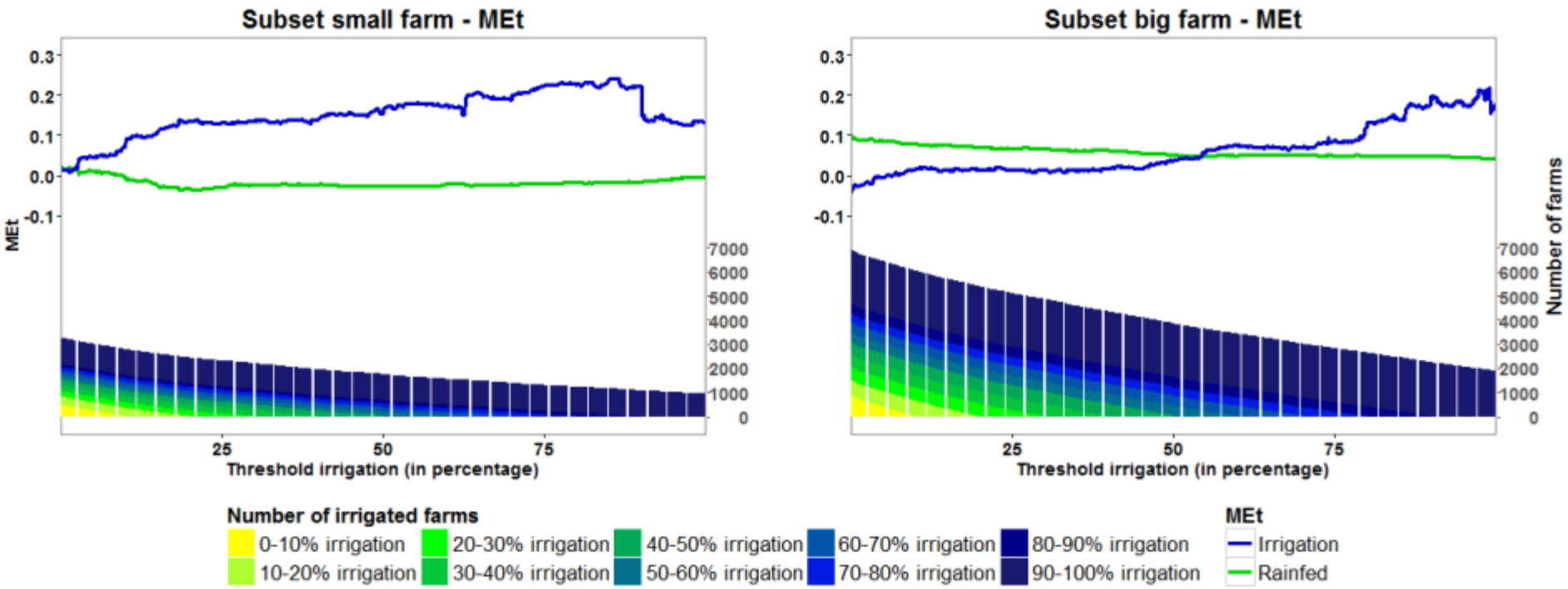

MEt
0%
90%
[-0.8,-0.6)
[-0.6,-0.4)
[-0.4,-0.2)
[-0.2,-0.1)
[-0.1,0)
[0,0.1)
[0.1,0.2)
[0.2,0.4)
[0.4,0.6]
RAINFED
IRRIGATION

MEp full sample



MEp_irrigation < MEp_rainfed from 74,1% threshold on

Economic Farm Size (FADN categories)



MEt_irrigation > MEt_rainfed
From 1,8% onwards

MEt_irrigation > MEt_rainfed
from 54,4% onwards

Conclusions

- More irrigation = MEt ↑ & MEp ↓
  - = the % irrigation matters
- Farm heterogeneity influences MEt & MEp
- Important to understand the evolution of the accordance/proportion between Rainfed and Irrigation: from WHICH point on is irrigation more interesting?

Thank you for your attention!

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