

Accounting data for assessing environmental efficiency of farms - an Austrian case study



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Introduction



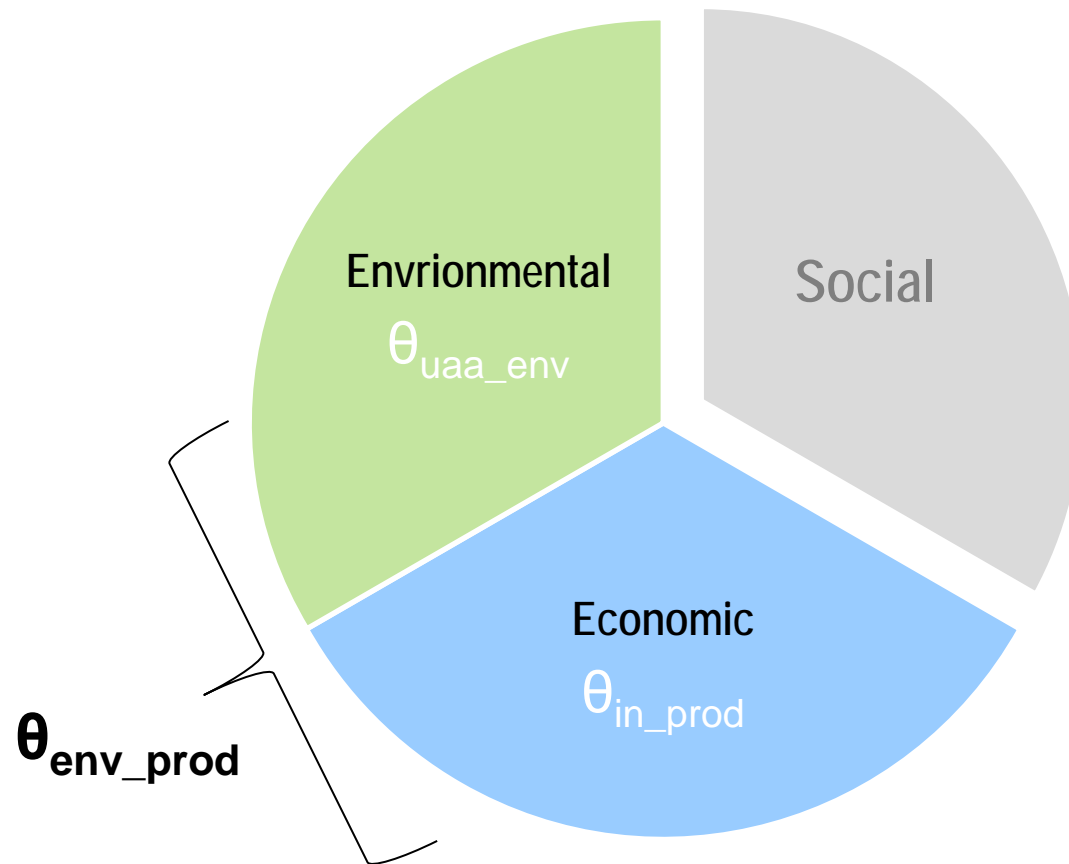
Efficiency:

$$Eff = \frac{Output}{Input}$$

Introduction



Sustainability:



Overview



- Introduction
- Method and Data
 - Data Envelopment Analysis (DEA)
 - Specification of the Models
- Results
- Discussion

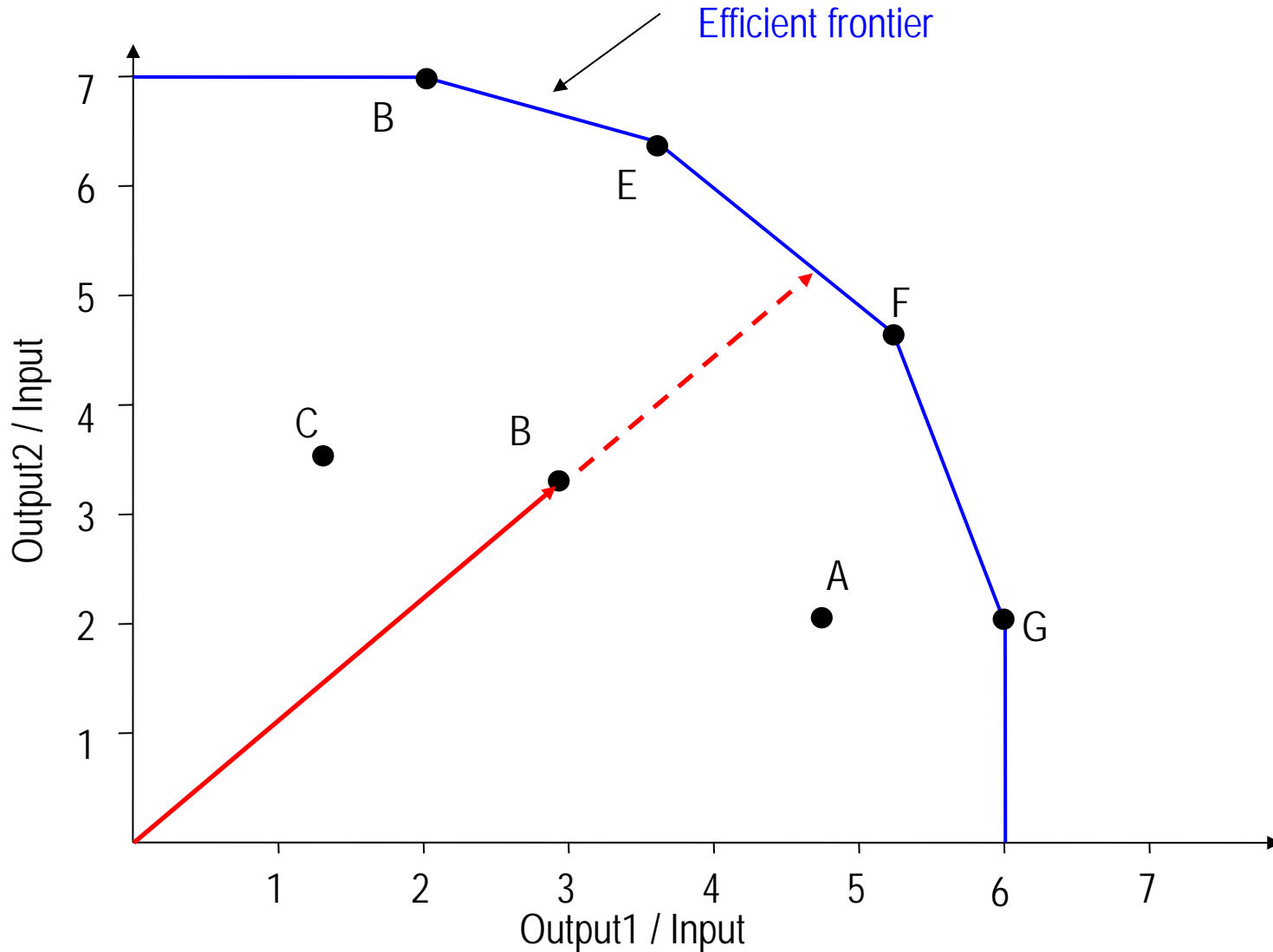
Research questions



- ? Do organic farms perform better than conventional farms?
 - Comparison of organic and conventional cash crop farms

- ? Do natural conditions influence environmental efficiency?
 - Comparison of Dairy farms in mountainous areas with flatland dairy farms

A DEA Example - 1 Input / 2 Outputs



Input and Output Variables

Model 1 θ_{in_prod} – Production orientated analysis



Input

- Pesticides/Fertilizers/
Concentrated Feed
- Energy
- UAA
- Capital
- Workforce

Agricultural
production

Output

- Production
(produced energy in
"Getreideeinheiten")

Input and Output Variables

Model 2 θ_{uaa_env} – Environment orientated analysis



Input

- UAA

Agricultural
production

Output

- Crop rotation
- Pesticides/Fertilizers/
Concentrated Feed
- Energy
- Intensity

Input and Output Variables

Model 3 θ_{env_prod} – Combination of Model 1 and Model 2



Input

- Crop Rotation
- Pesticides/Fertilizers/
Concentrated Feed
- Energy
- Intensity
- UAA

Agricultural
production

Output

- Production
(produced energy in
"Getreideeinheiten")

Environment-oriented, Production-oriented and Environment-Production-oriented technical efficiency

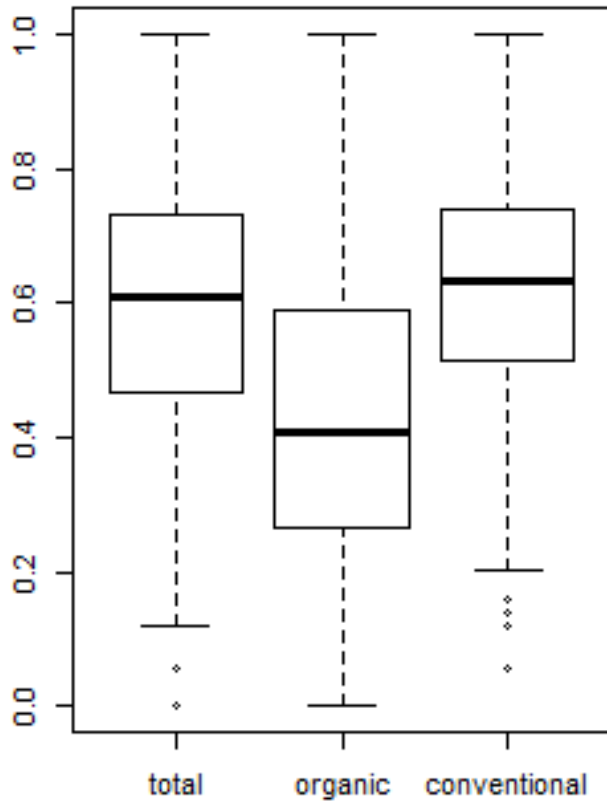


		Model 1 θ_{in_prod}	Model 2 θ_{uaa_env}	Model 3 θ_{env_prod}
Cash-crop farms	<i>Mean (SD)</i>	0.59 (0.21)	0.68 (0.13)	0.88 (0.09)
Dairy farms	<i>Mean (SD)</i>	0.61 (0.17)	0.52 (0.13)	0.7 (0.12)

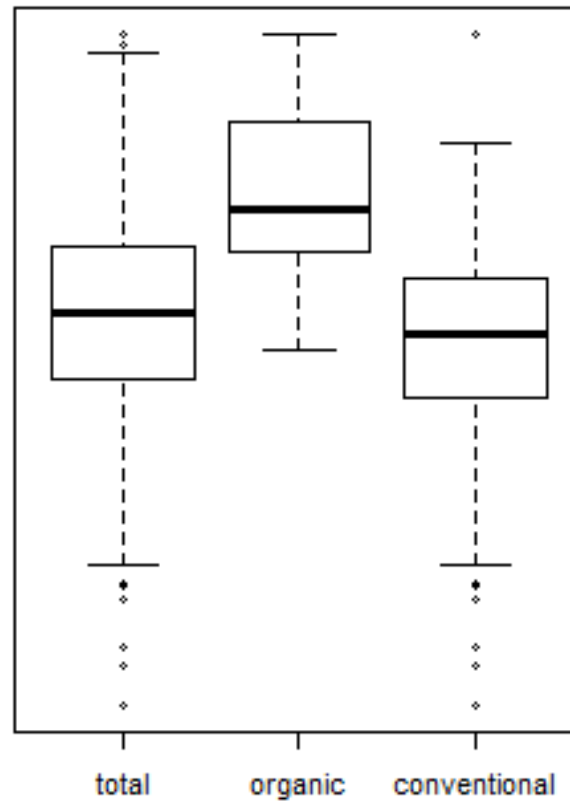
Results for Cash-crop Farms



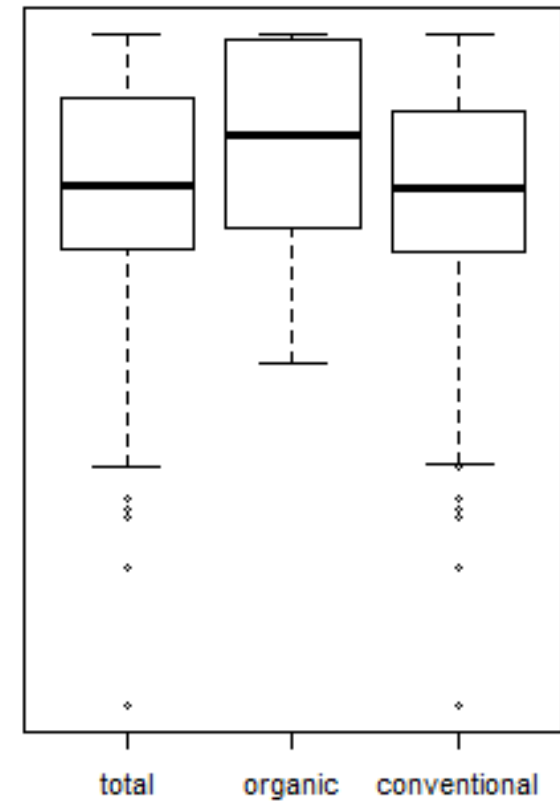
Model 1 θ_{in_prod}



Model 2 θ_{uaa_env}



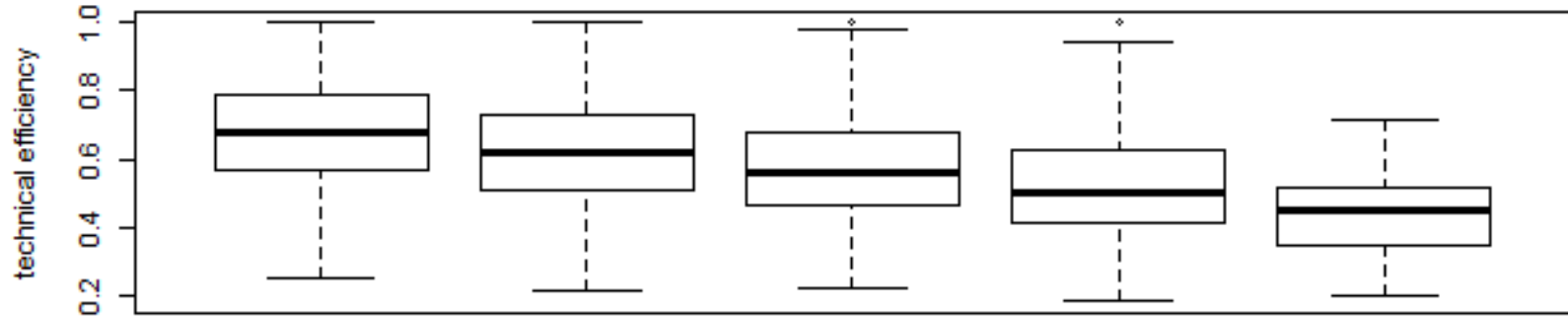
Model 3 θ_{env_prod}



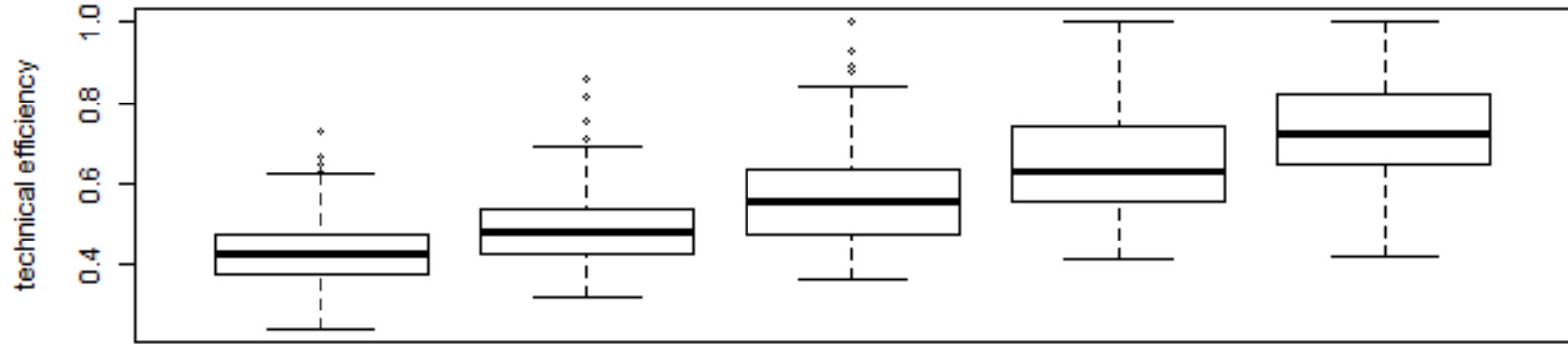
Results for Dairy Farms



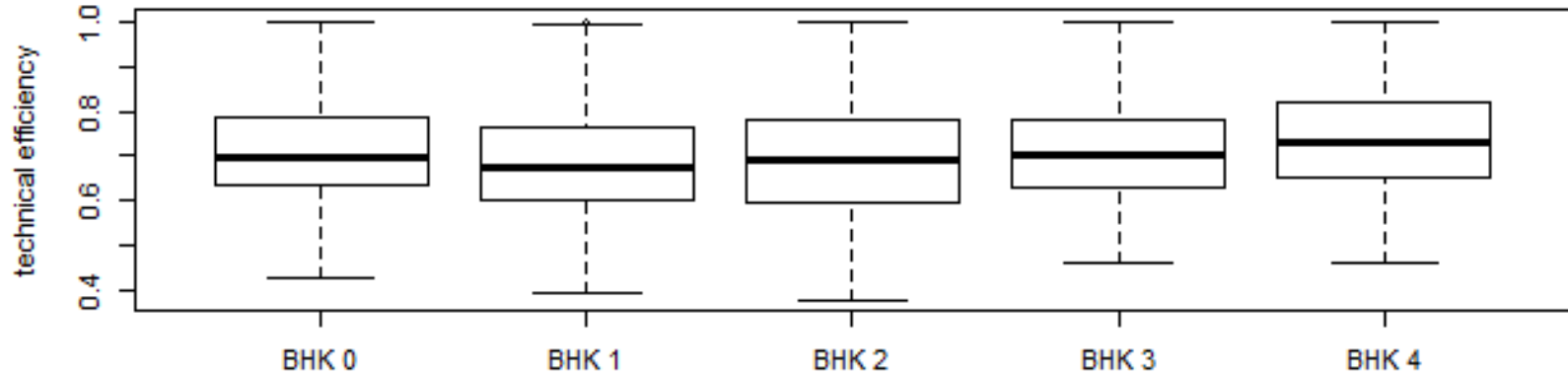
Model 1 θ_{in_prod}



Model 2 θ_{uaa_env}



Model 3 θ_{env_prod}

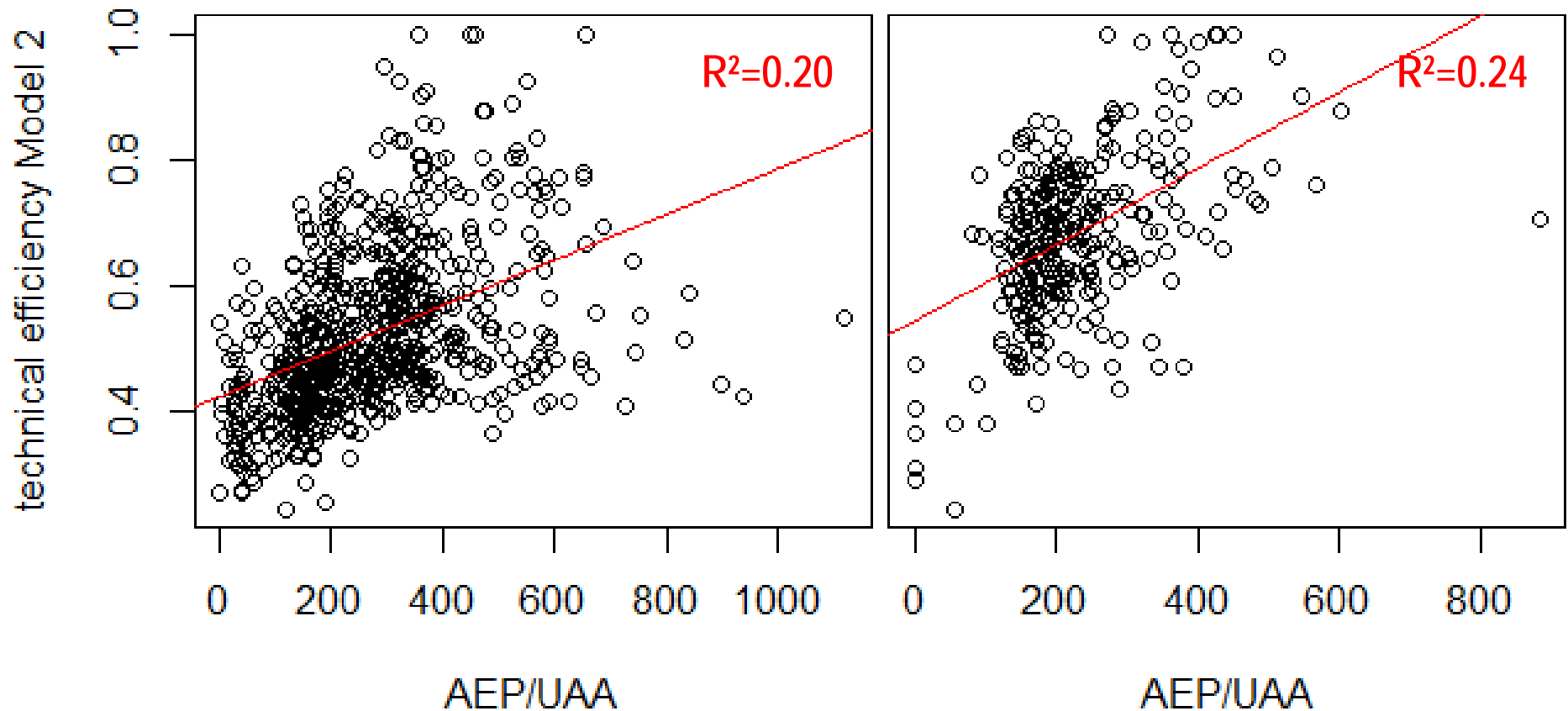


Impact of efficiency on received agri-environmental payments



Dairy farms

Cash-crop farms



Discussion and Conclusion



- more detailed data base → higher accuracy
- broad data base → representative results
- **Organic** cash-crop farms:
 - Model 1 θ_{in_prod} ↓
 - Model 2 θ_{uaa_env} ↑
 - Model 3 θ_{env_prod} ↗
- high impact of natural conditions on efficiency



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