

# "Green" obligations: impacts and avoidance behaviour among EU farmers

Lessons from Spanish administrative data

Zelda Brutti, Marzia Freo, Laura Serlenga

European Commission, Joint Research Centre

EEA Congress 2024, Rotterdam – August 26<sup>th</sup> 2024



# The EU Common Agricultural Policy (CAP)

- It is the largest EU program in terms of budget allocation ( $\approx 31\%$  of total EU budget)
  - **Direct payments to farmers** have been accounting for  $\approx 70\%$  of CAP funds
    - meant to provide income support, competitiveness and sustainability
    - nearly half of the agricultural income of farms came from this direct support over the last fifteen years
- The past CAP cycle went from **2014 to 2022**, the current one goes 2023-2027

Three mandatory practices, to contribute to the EU's environmental and climate goals:

- **Crop Diversification (CD)**  
to enhance the resilience of soil and ecosystems
- **Permanent Grassland (PG)**  
to support carbon sequestration and protect habitats
- **Ecological Focus Areas (EFA)**  
to aid biodiversity

# «Greening»

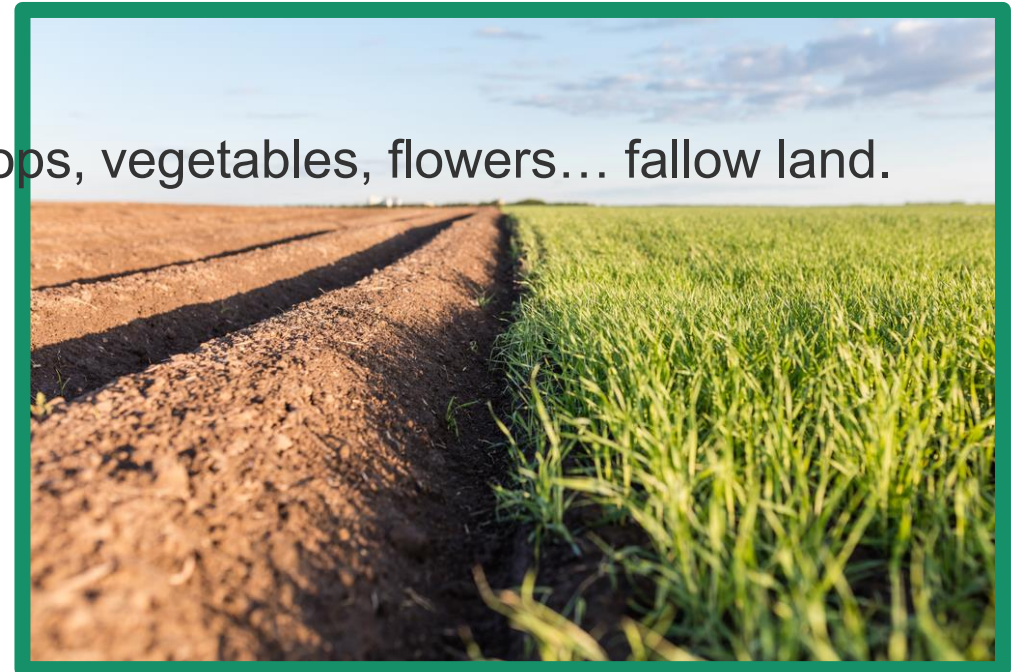
(Regulation EU No 1307/2013)

Starting with the 2014 CAP policy cycle, ≈ 30% of the direct payments to farmers were earmarked as ‘Greening payments’

- without altering the overall budget
- granted at the farm-level
- **exceptions for farmers under special circumstances** (organic; small-farmer scheme; specific exemptions)

# Definitions

- **Utilised agricultural area (UAA)**, is the total area taken up by arable land, permanent grassland, permanent crops and kitchen gardens used by the holding
- **Arable land (AL)** is land worked (ploughed or tilled) regularly, often under a system of crop rotation
  - Cereals, protein crops, root crops, industrial crops, vegetables, flowers... fallow land.



# Greening requirements at the farm level

## Crop diversification (CD)

Arable land size	Requirement
< 10 ha	-none-
$10 \leq \text{ha} < 30$	<b>2 crops</b> (main c. $\leq 75\%$ )
$\geq 30$ ha	<b>3 crops</b> (main c. $\leq 75\%$ ; first 2 c. $\leq 95\%$ )



## Ecological Focus Areas (EFA)

Arable land size	Requirement
< 15 ha	-none-
$15 \leq \text{ha}$	<b>5% of arable land</b>

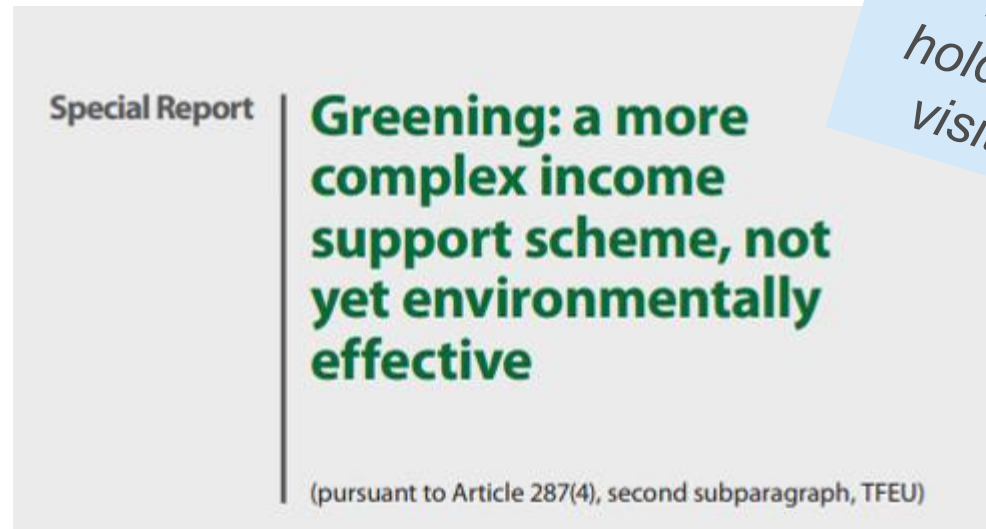


# Expected impact of Greening provisions

Most existing literature is **ex-ante assessment**, rather than ex-post evaluation.

Most existing ex-post literature based on **small samples**.

*European Court of Auditors (2017)*



Sample of 145 holdings visited

- “Greening as currently implemented is **unlikely to provide significant benefits for the environment and climate**”
- “Greening has led to **very limited change in farming practices**”
- “Greening requirements for crop diversification and EFAs led to a change in farming practice on around 2 % of EU farmland” (13% of holdings for CD, 37% of holdings for EFA)

# Research questions

Can we identify a **reaction** to the Greening policy provisions among EU (Spanish) farmers?

If yes, how large is it?

- **Crop diversity**
- Area dedicated to EFA

“First stage” impact

Can we identify **impacts on environmental outcomes** attributable to the Greening policy provisions?

- **Soil quality**
- Biodiversity

“Second stage” impact

# Today

- Data
- Descriptive results and insights
- Counterfactual impact evaluation
  - On crop diversity
  - On soil quality
- Next steps



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# GeoSpatial Aid Applications (GSAA)

“Geospatial aid application as part of the Aid applications subsystem of IACS, defined by Art. 68 of Regulation 1306/2013.” (IACS = *Integrated Administration and Control System*)

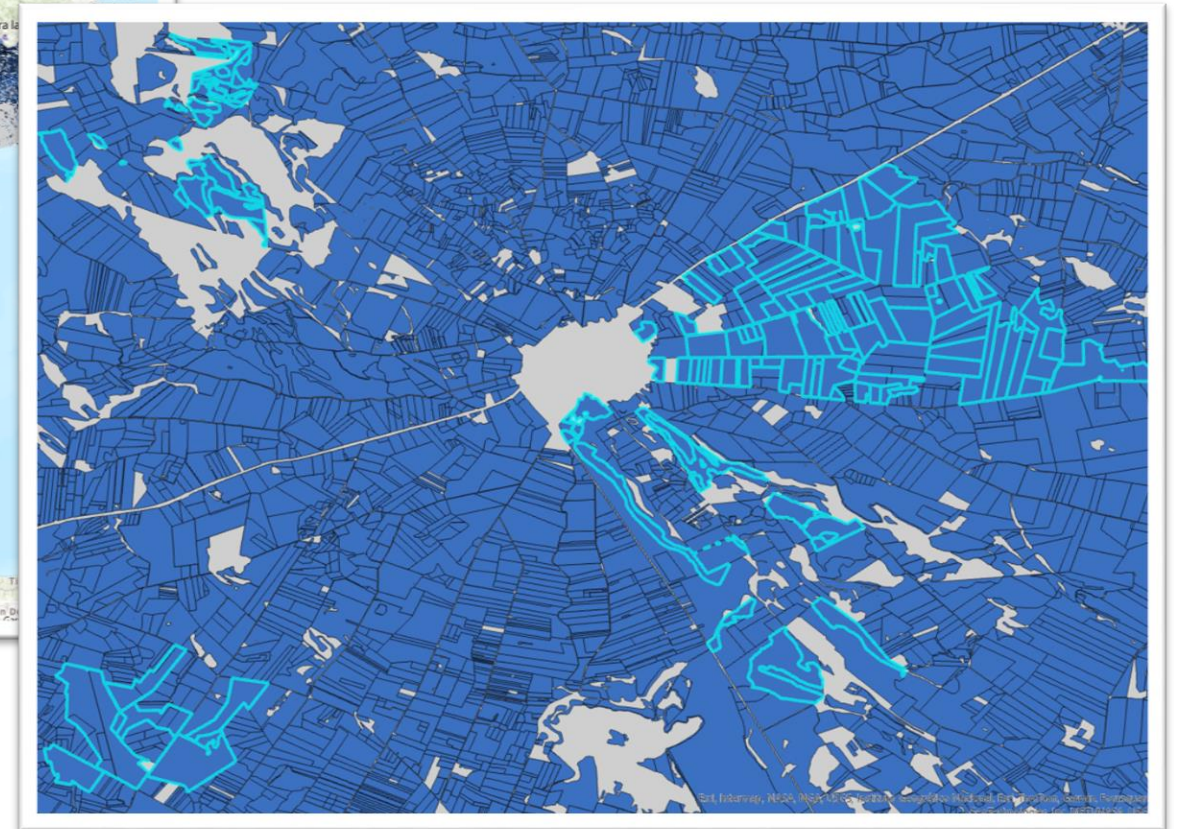
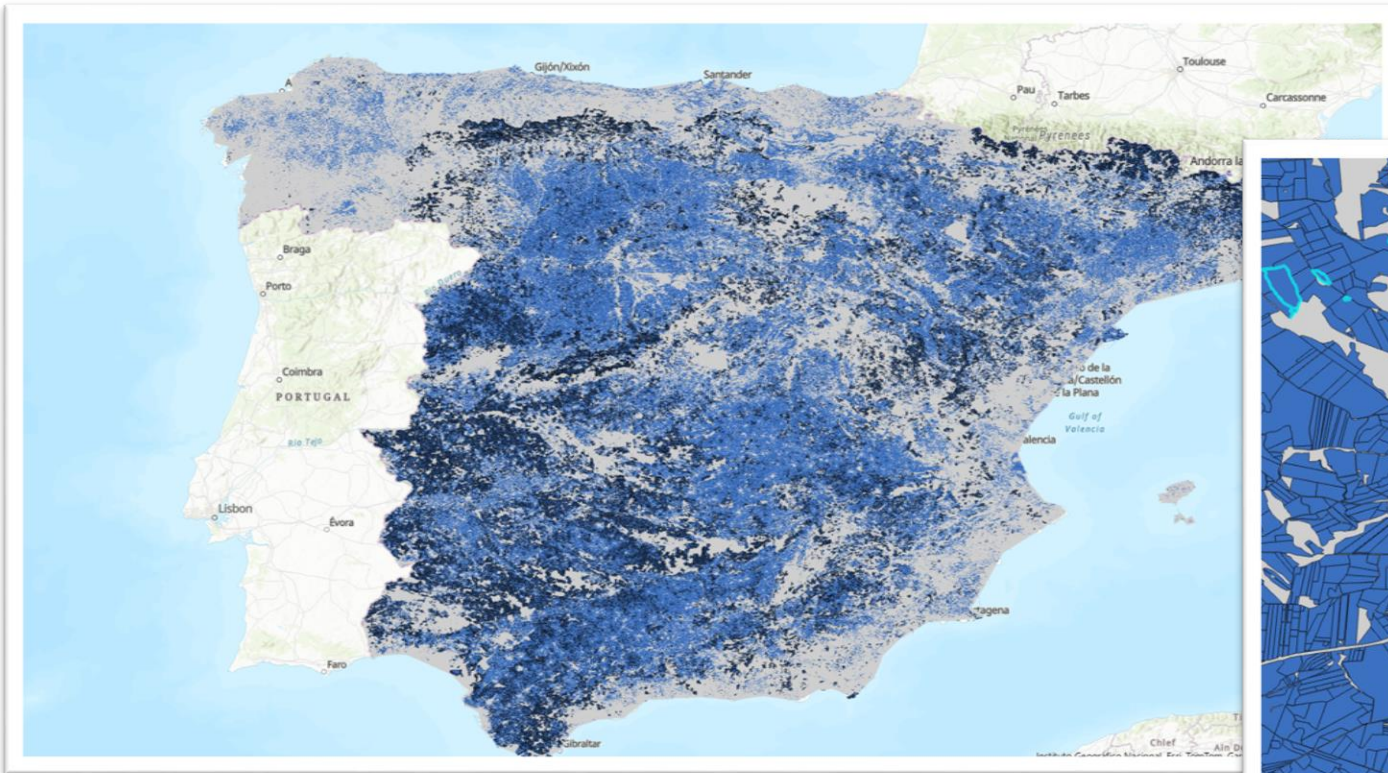


“Delineation of agricultural parcels with cultivated crop or crop groups as submitted by the farmer in a given year”

- Self-declared by farmers (Feb-May)
- Base for receiving subsidies
- Subject to monitoring (?)

# Spanish GSAA data for 2022

- 8-9 years since Greening



- Universe of CAP applicants
- 1 application per farm holding
- Data at plot-level (work at holding-level)

# Summary statistics

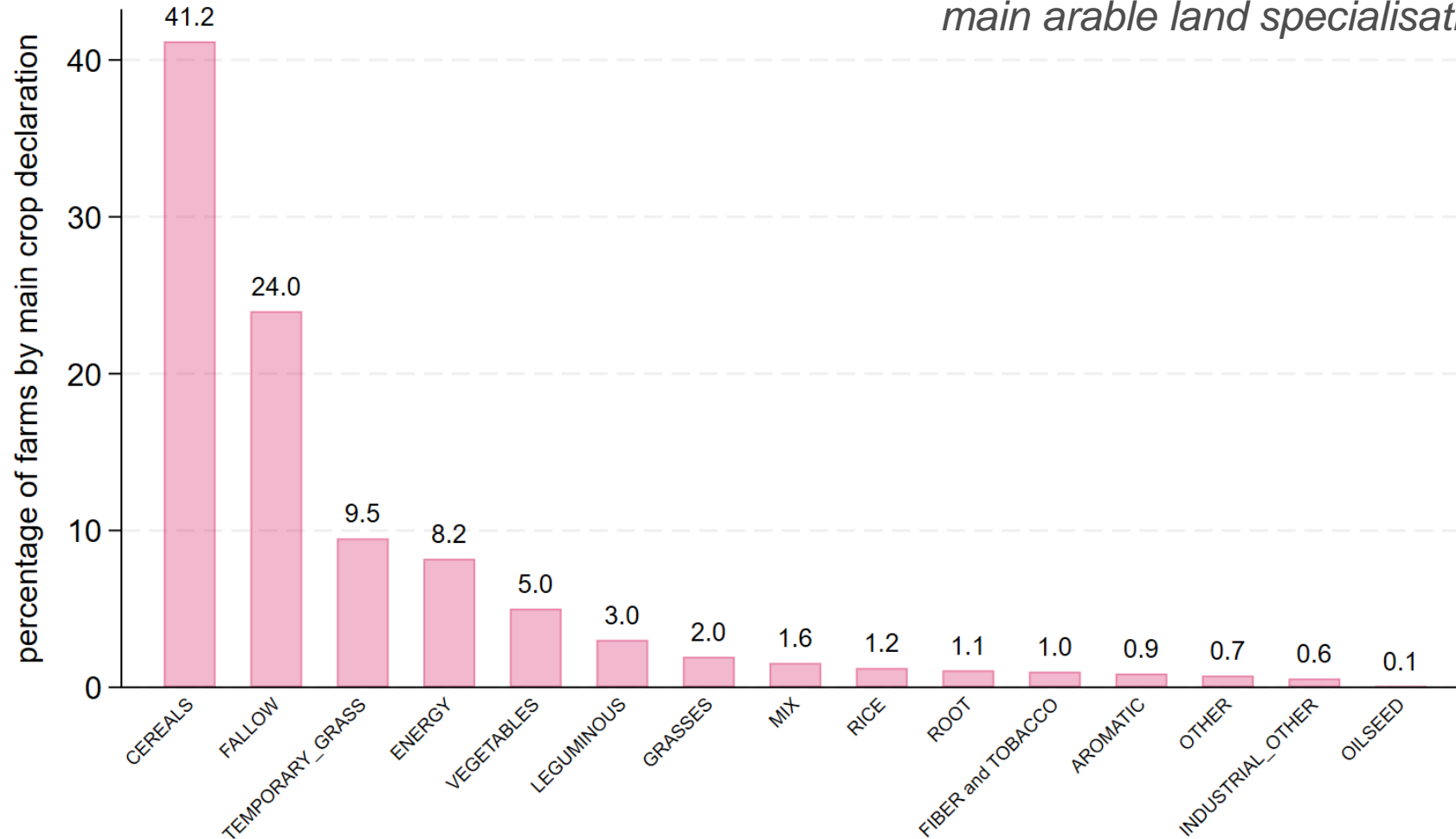
Item	Value in dataset (2022)	Official Value from Spanish Ministry of Agriculture
Total number of holdings		914,871 (2020)
UAA size (mean)		26.37 ha (2020)
Holdings applying for CAP subsidies	643,049	<b>648,691 (2022)</b>
Plots declared	18,226,872	
Declared UAA size (mean / median)	44.8 / 7.2	
Declared AL size   >0 (mean / median)	37.2 / 6.9	

# Today

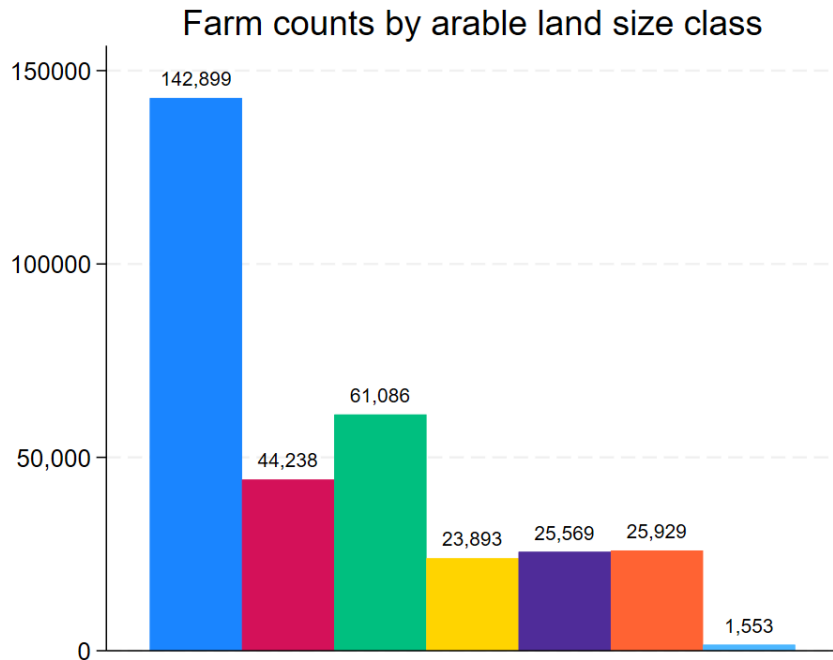
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# Spanish farms in 2022

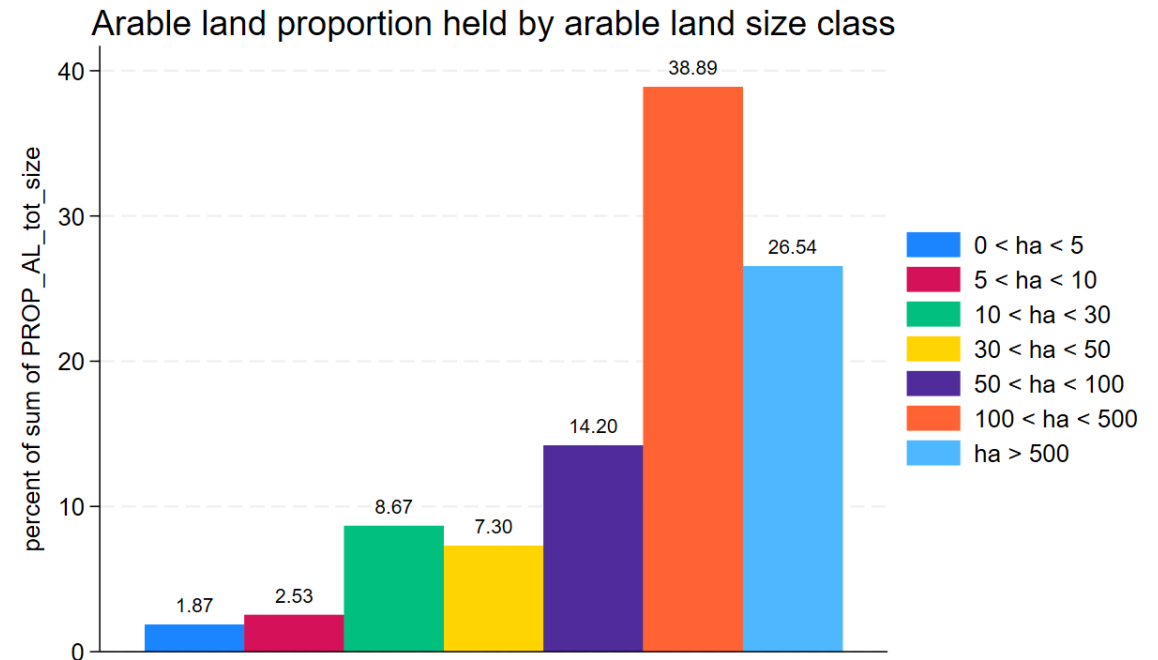
*Cereals, grasses and energy crops constitute the main arable land specialisation for 83% of holdings.*



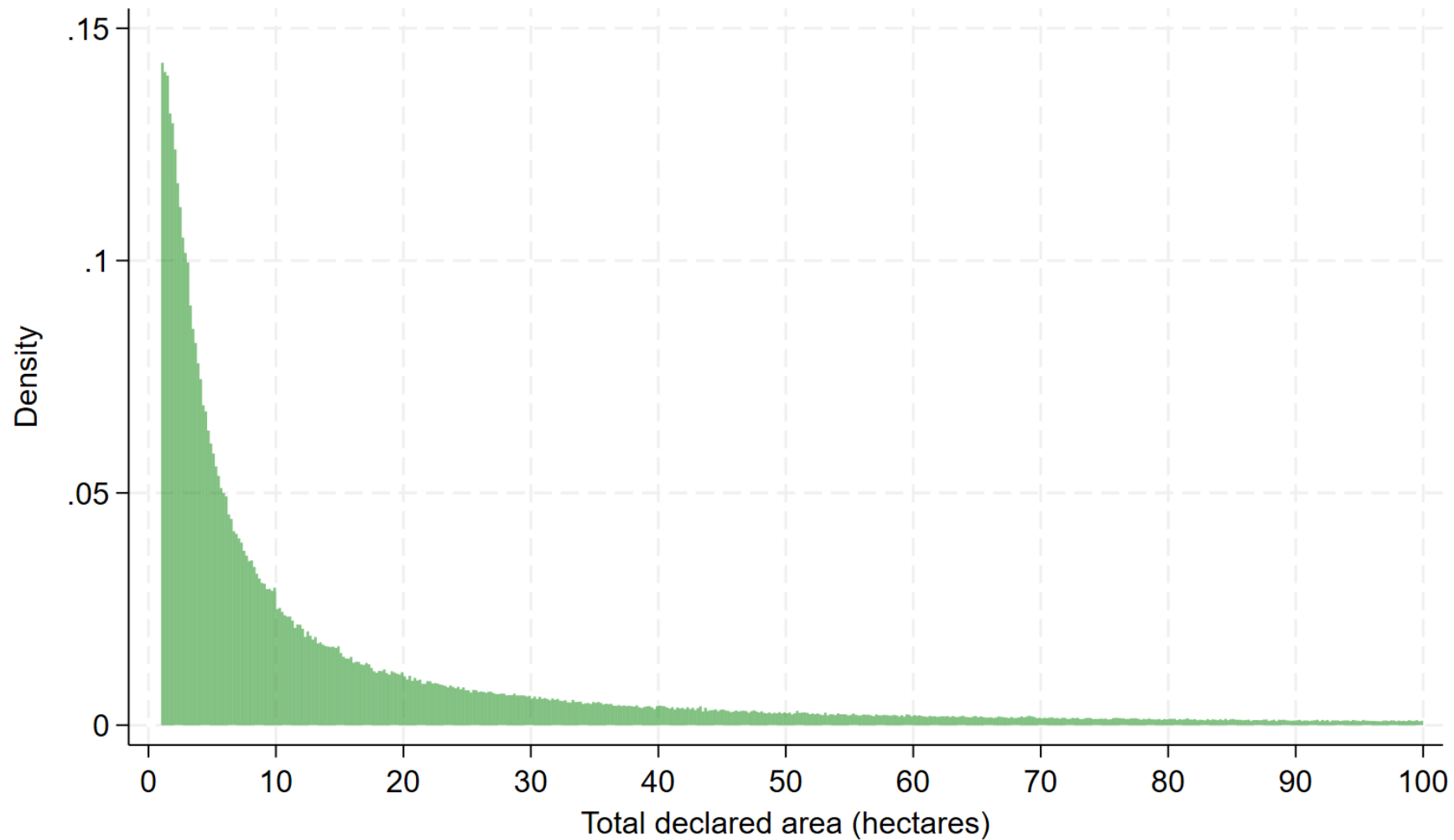
# Spanish farms in 2022



*Many small holdings, but >60% of arable land is held in holdings above 100 ha.*

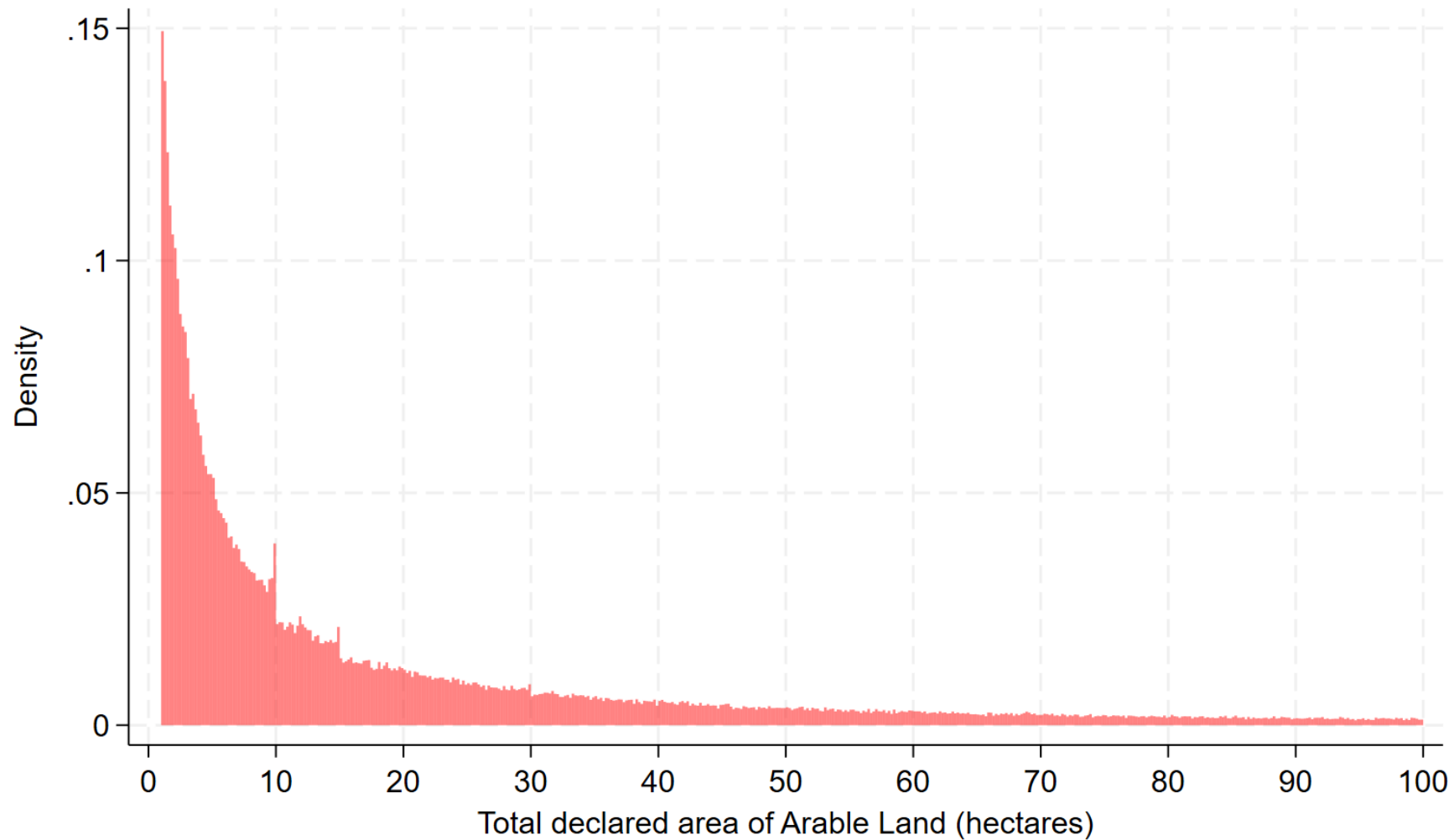


# Distribution of farms by total size (UAA)

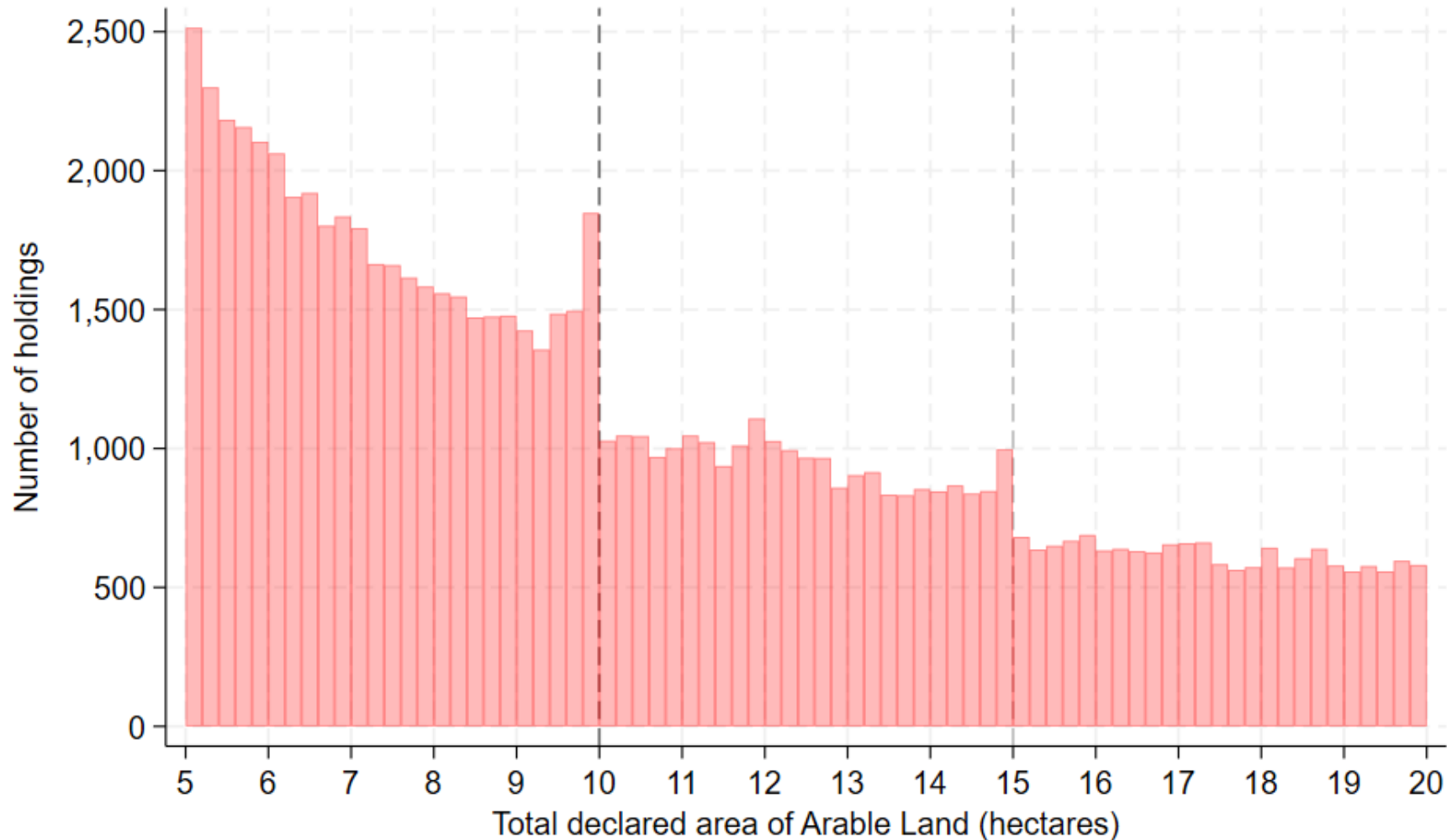




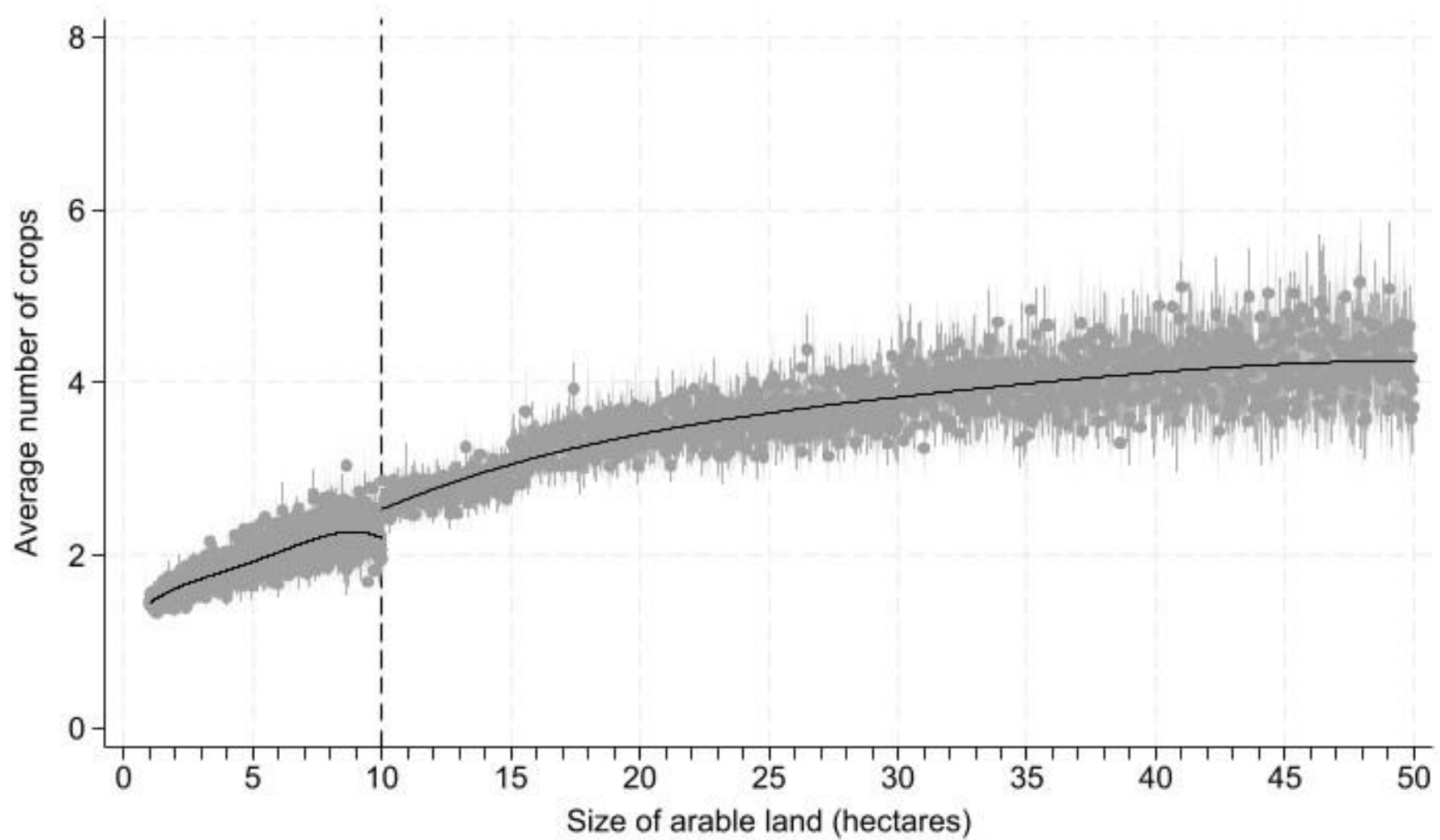
# Distribution of farms by AL size



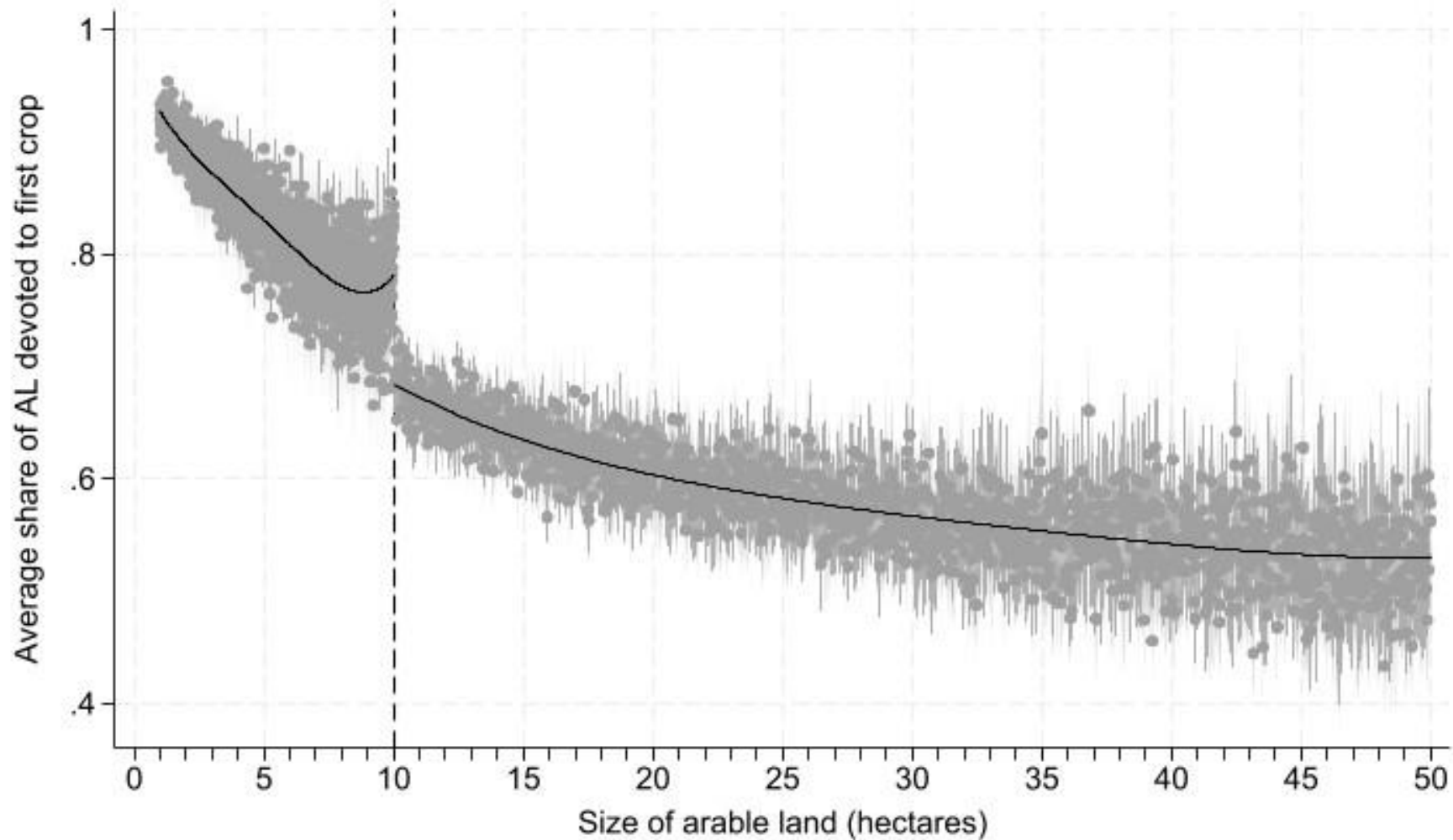
# Bunching at relevant policy thresholds



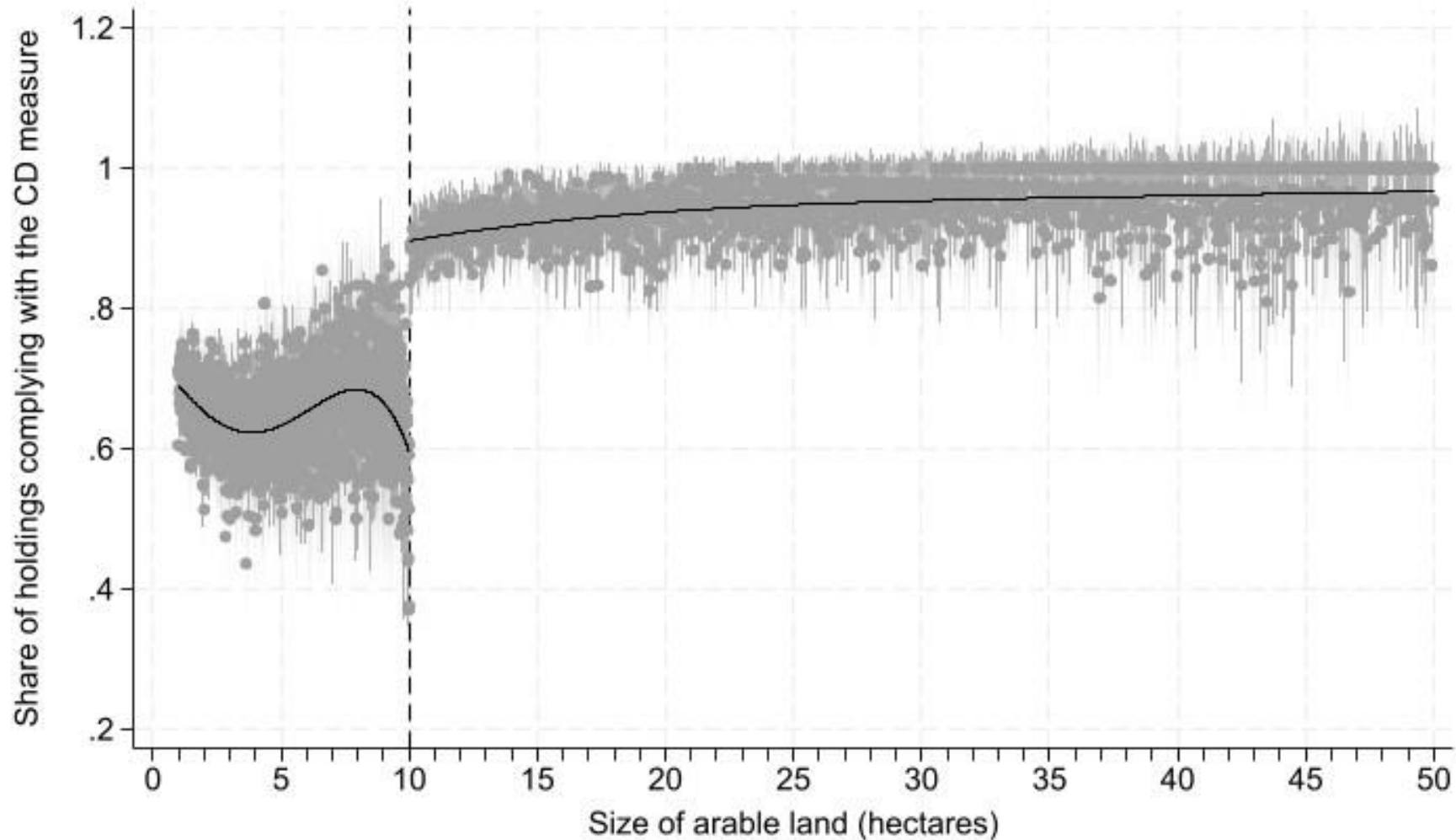
# Crop diversity (CD)



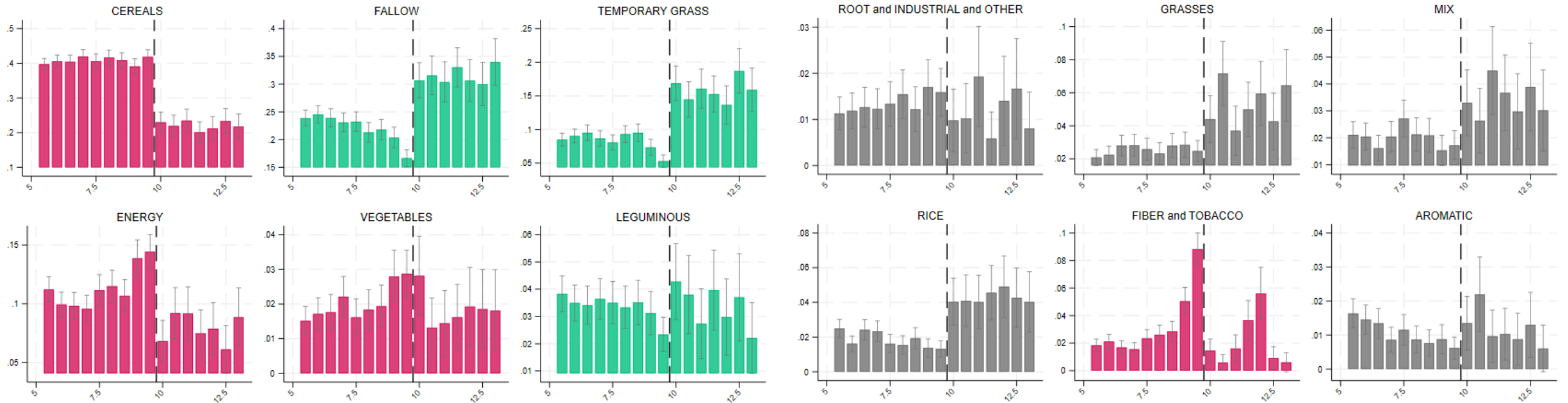
# Share main crop



# Compliance with the 2-crop CD rule



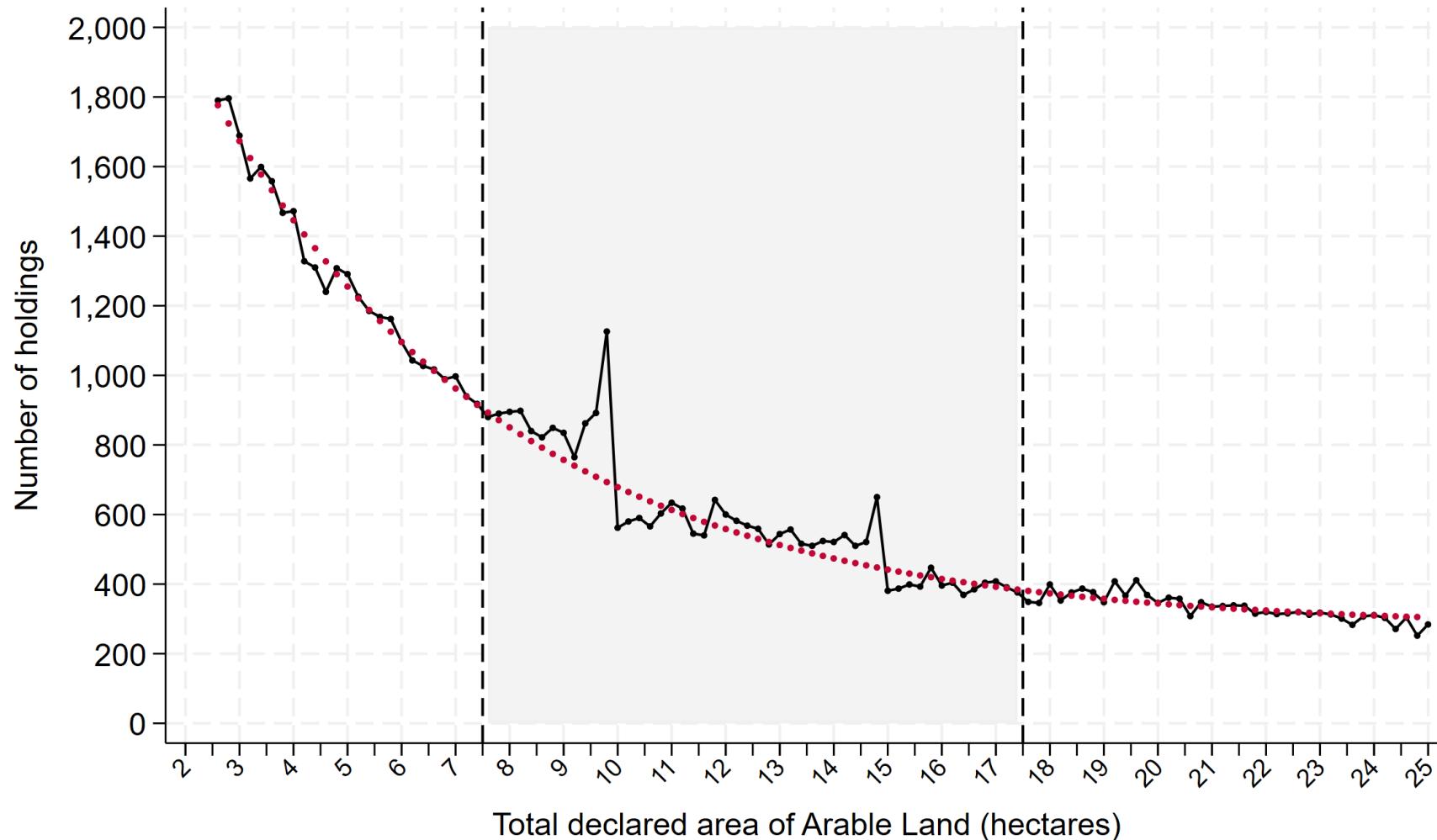
# Evidence of **sorting** across the 10ha threshold



Representation right after the 10 ha threshold: ■ Reduced ■ Increased ■ Stable / noisy

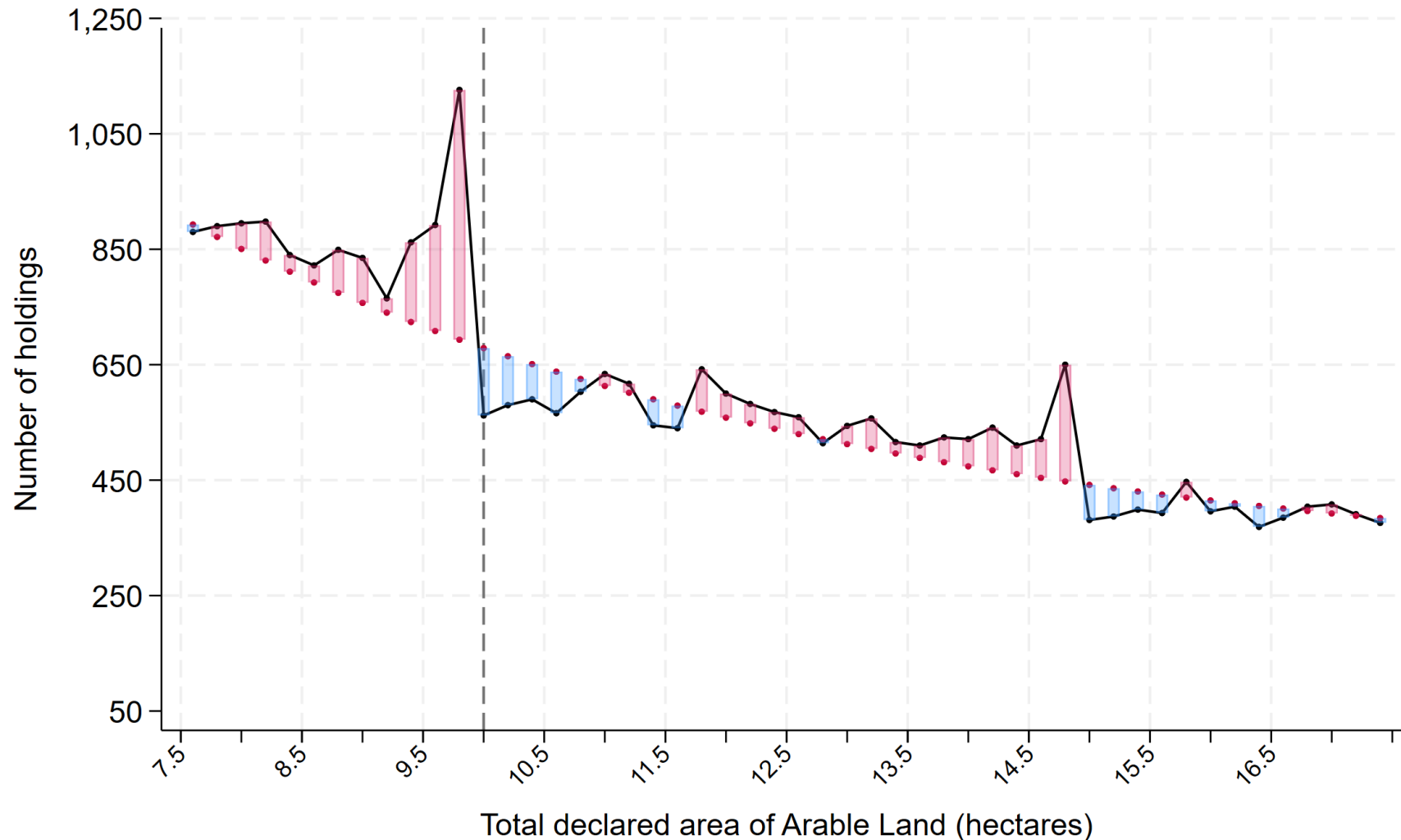
Exemptions from greening are granted for specialists (>75%) in grasses (fallow, temporary grass), leguminous crops and rice

# Quantification of the bunching phenomenon



Cereal and energy crop specialists

# Quantification of the bunching phenomenon



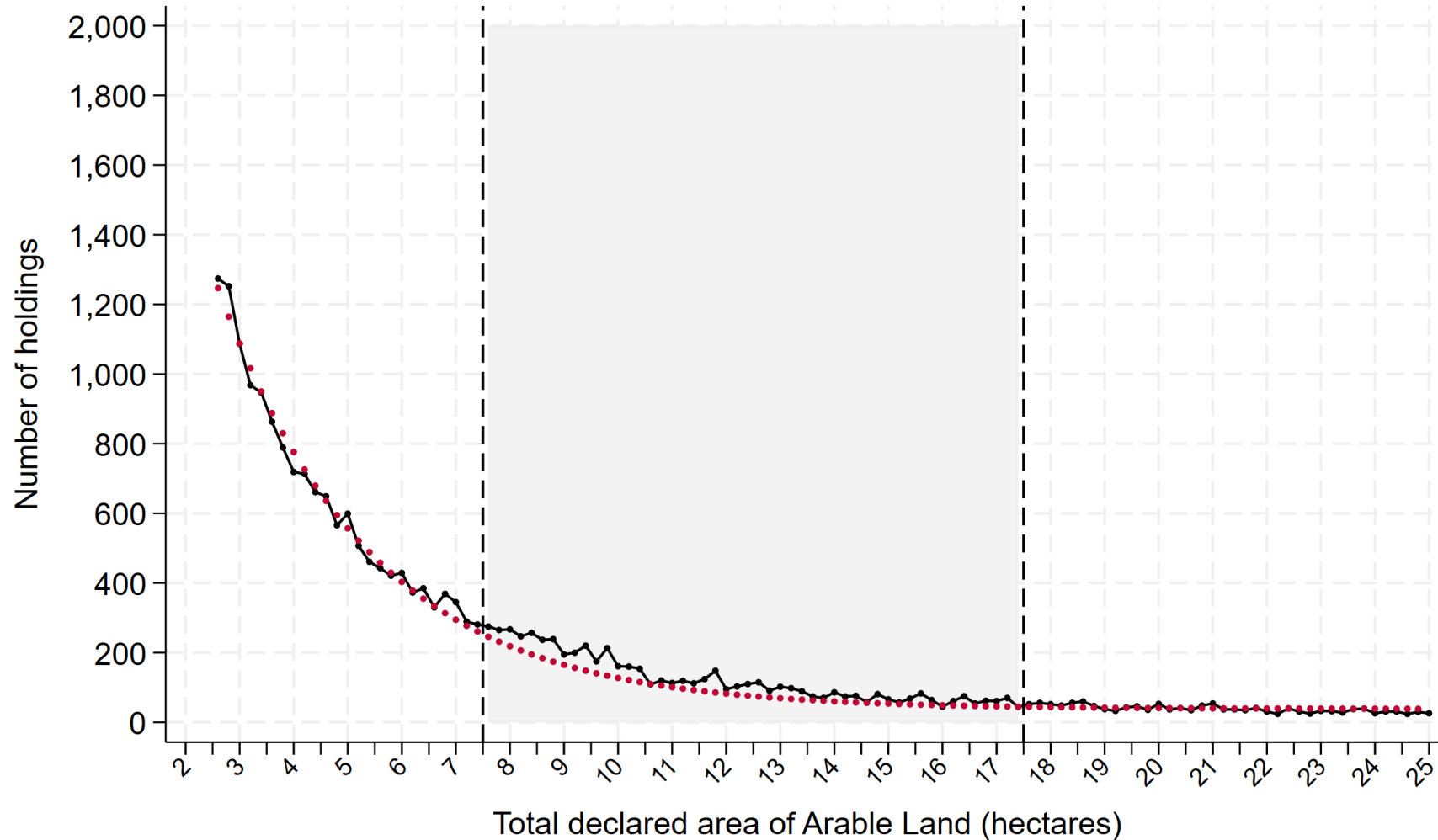
Cereal and energy crop specialists

11.7% «excess» farms between 7.5-10 ha of AL

Not all coming from the 2.5ha following the threshold

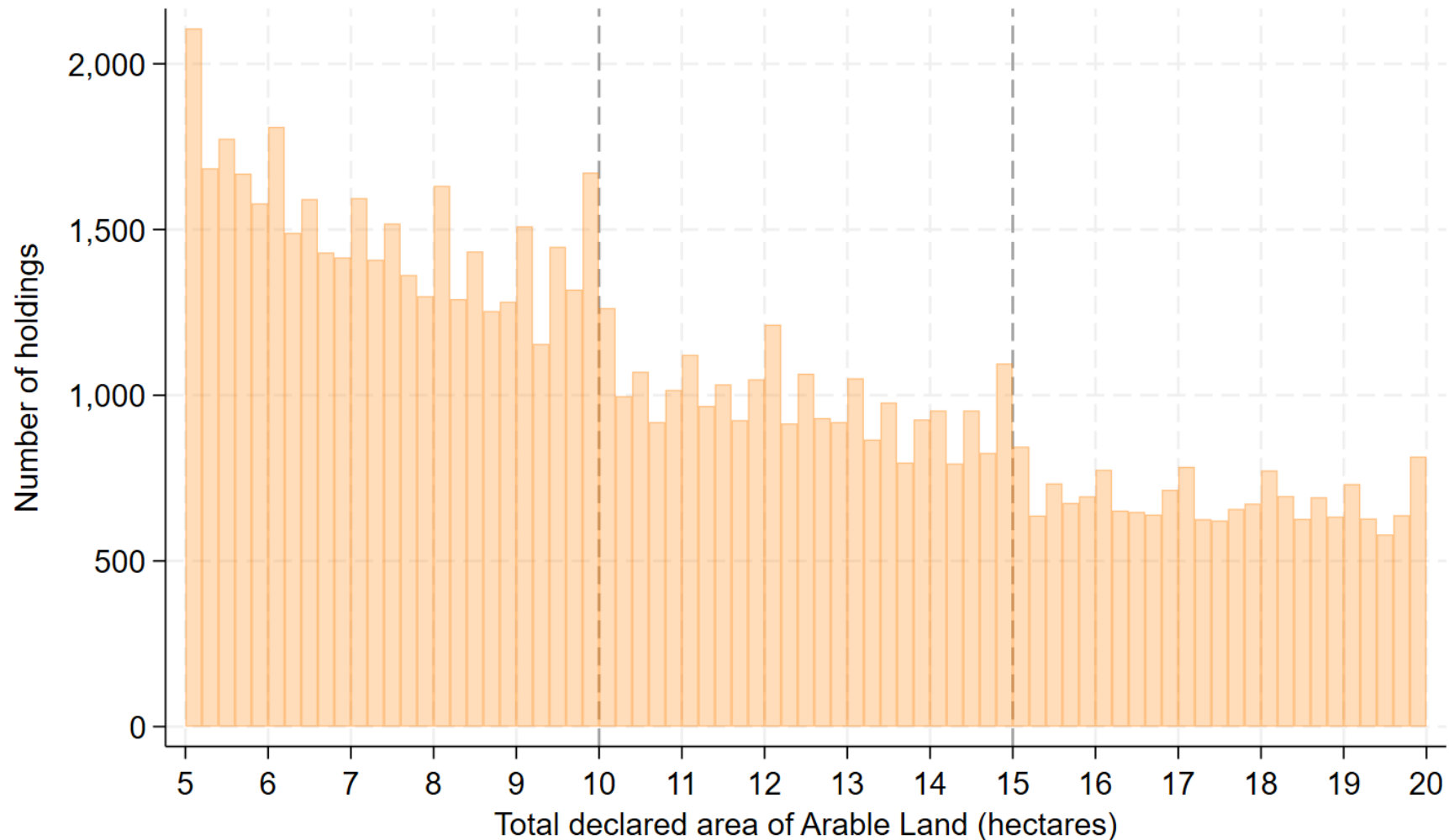


# No bunching in exempted categories



Grass  
specialists  
(exempted)

# Cross-check: Bunching in 2020 Census data

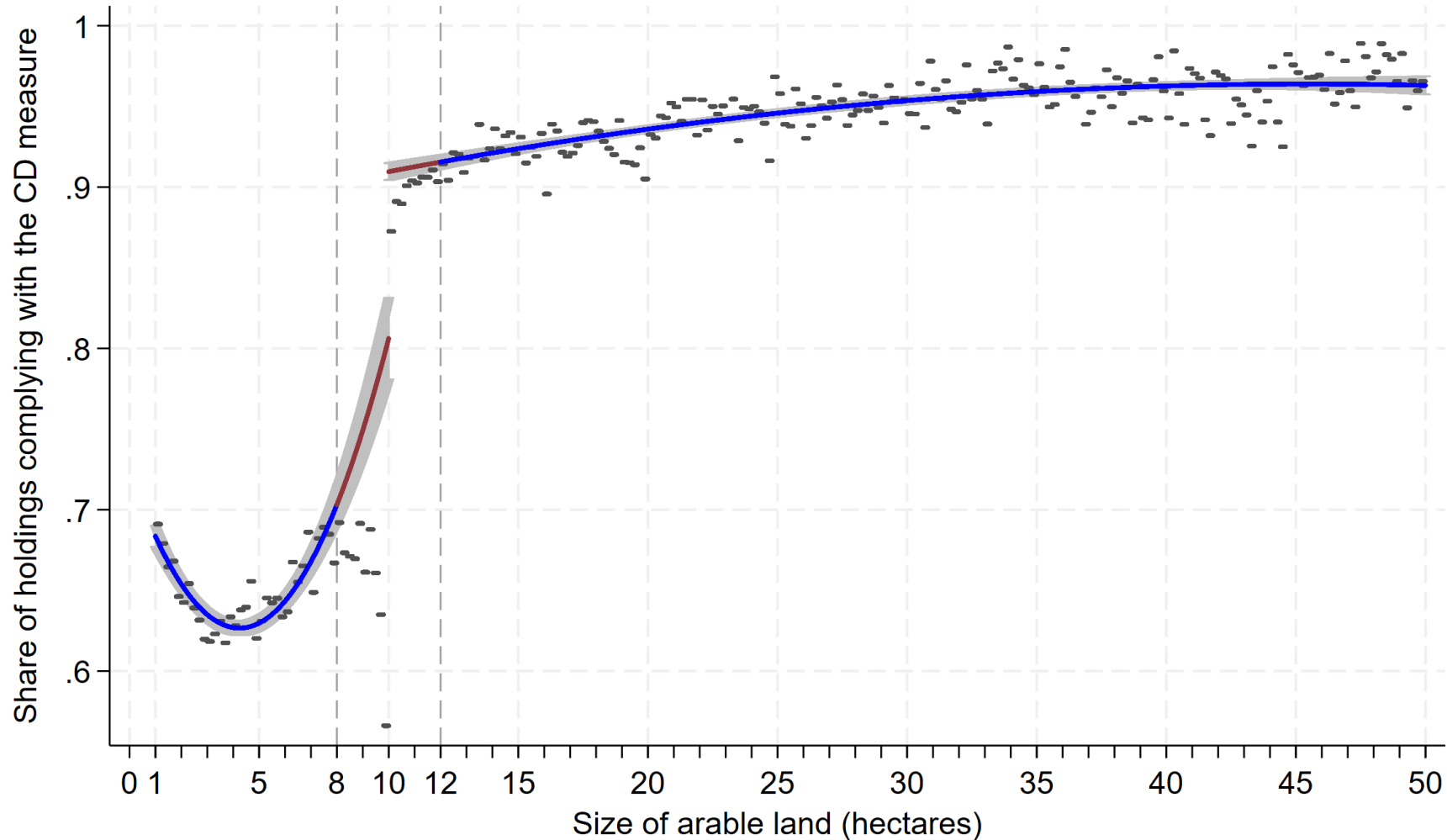


Not merely  
«adjusted  
declarations»

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# Estimation of the policy effect (compliance) correcting for bunching



**8 pp** increase in compliance

**0.3 crops** more

**8 pp** decrease in first crop share

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# Soil quality

## SOC Soil Organic Carbon content

### *LUCAS Soil modules (2009-2015-2018)*

- provide chemical properties of EU topsoil, sampled between 0 and 20cm of depth
- sampling points are mostly located in non-urban areas (e.g. cropland, grassland and woodland)
- 3,867 soil quality measurements taken on Spanish soil in 2018

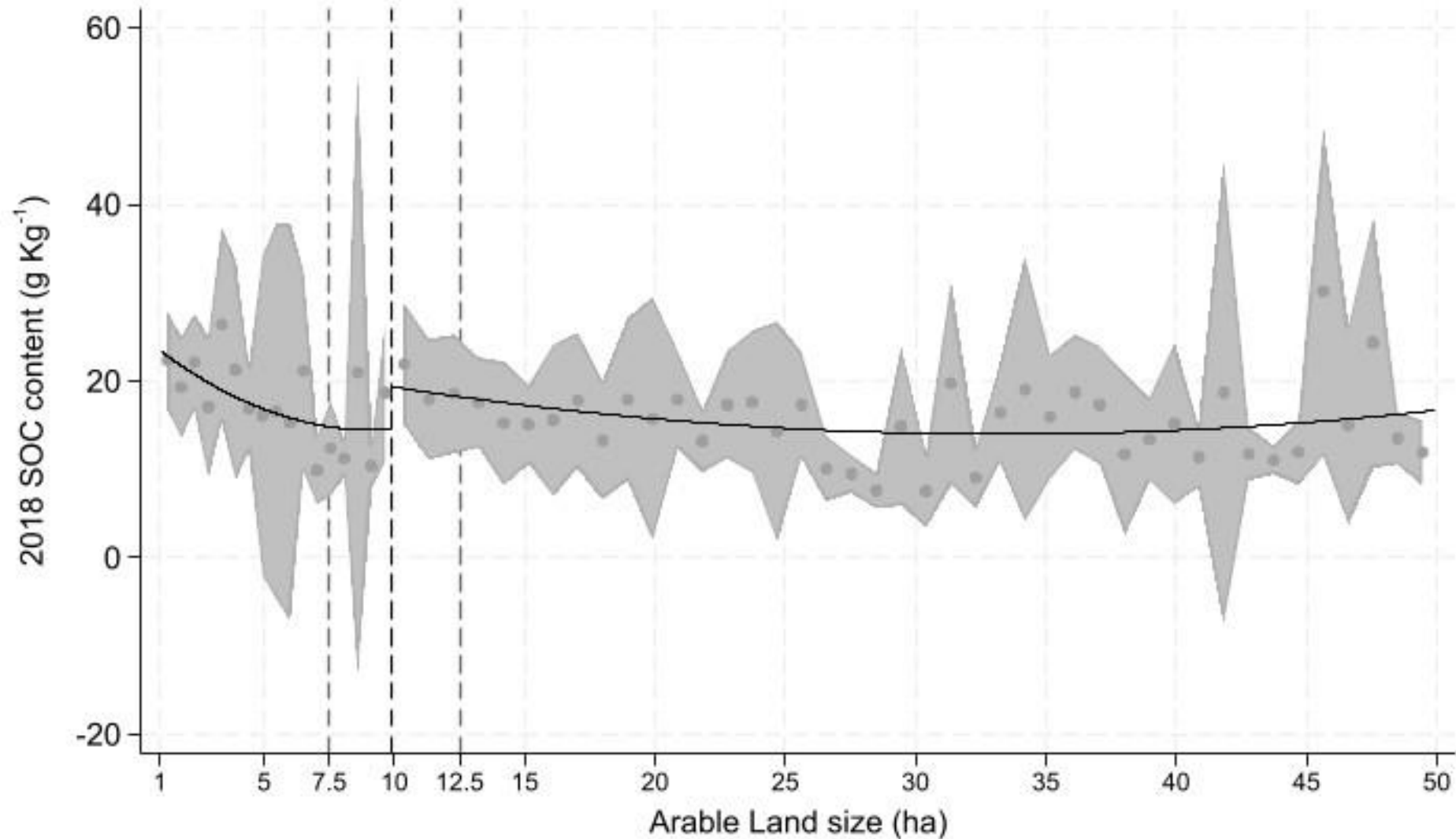
Instituto Geográfico Nacional, Esri,

# Small sample problem

Table 3: Summary statistics of the matching exercise between LUCAS 2018 and GSAA 2022 data

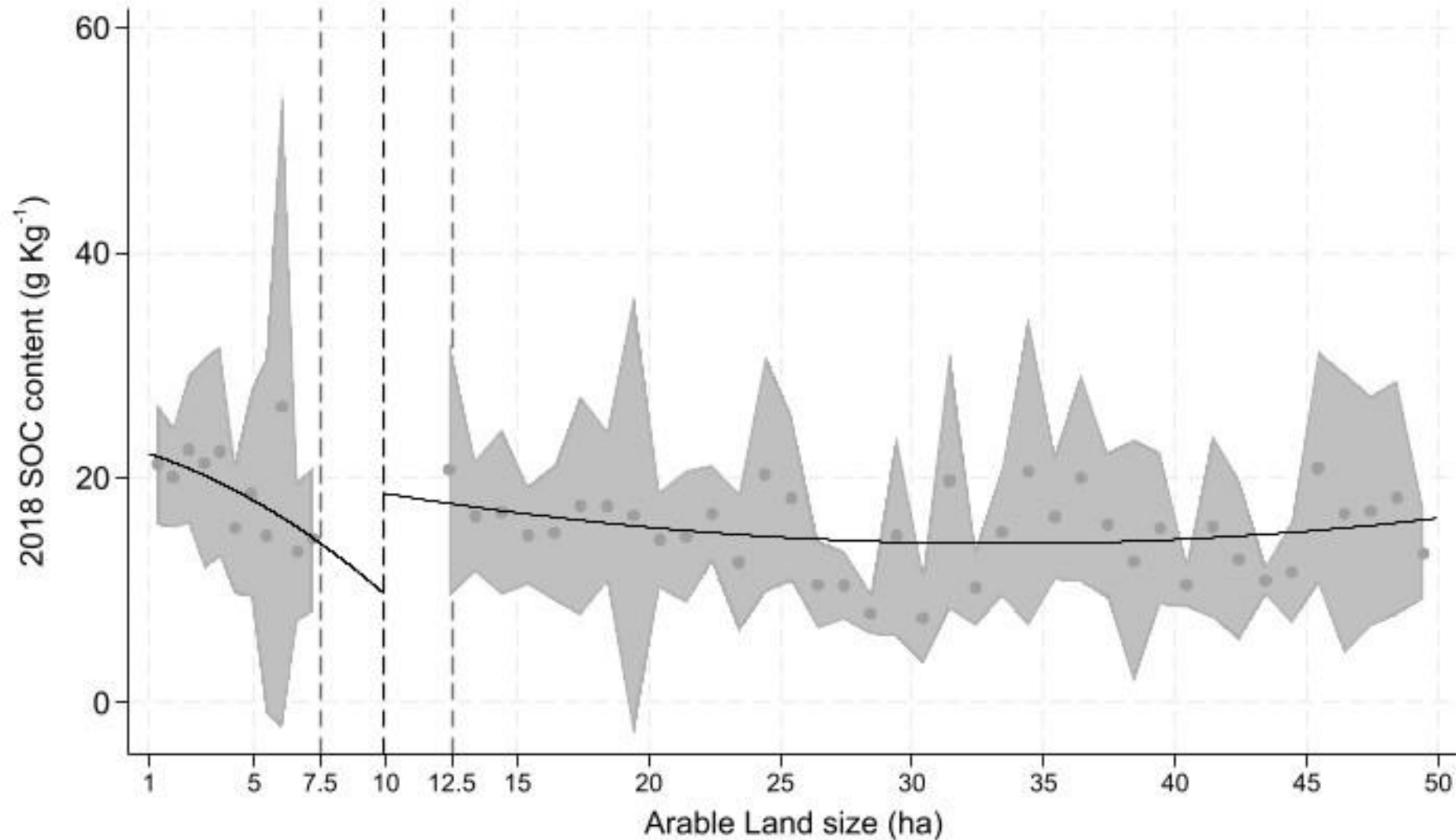
Number of holdings matched to 2018 LUCAS points	2,341	0.4% of total
<b>Median UAA size</b> of holdings matched to 2018 LUCAS points	<b>168 ha</b>	
<b>Median AL size</b> of holdings matched to 2018 LUCAS points	<b>124 ha</b>	
LUCAS 2018 sampling points in Spain	3,867	100%
[...] falling onto GSAA parcels	2,704	70%
[...] with a valid OC measurement	2,698	70%
[...] with a non-extreme OC measurement	2,667	69%
[...] falling onto holdings with AL	2,322	60%
[...] falling onto holdings 1 ha < AL size < 50 ha	<b>626</b>	<b>16%</b>

# Getting very noisy estimates on the RD





# Getting very noisy estimates on the RD



With  
leave-out  
window

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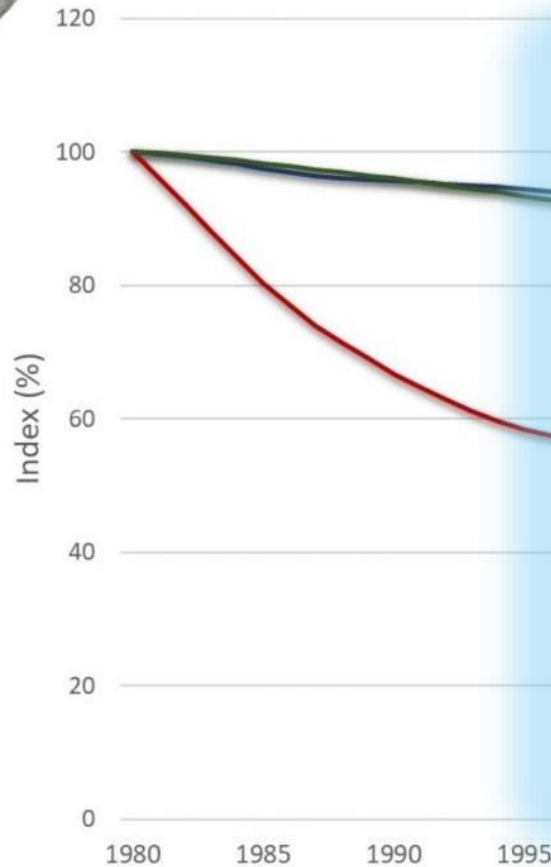


# 2023 UPDATE

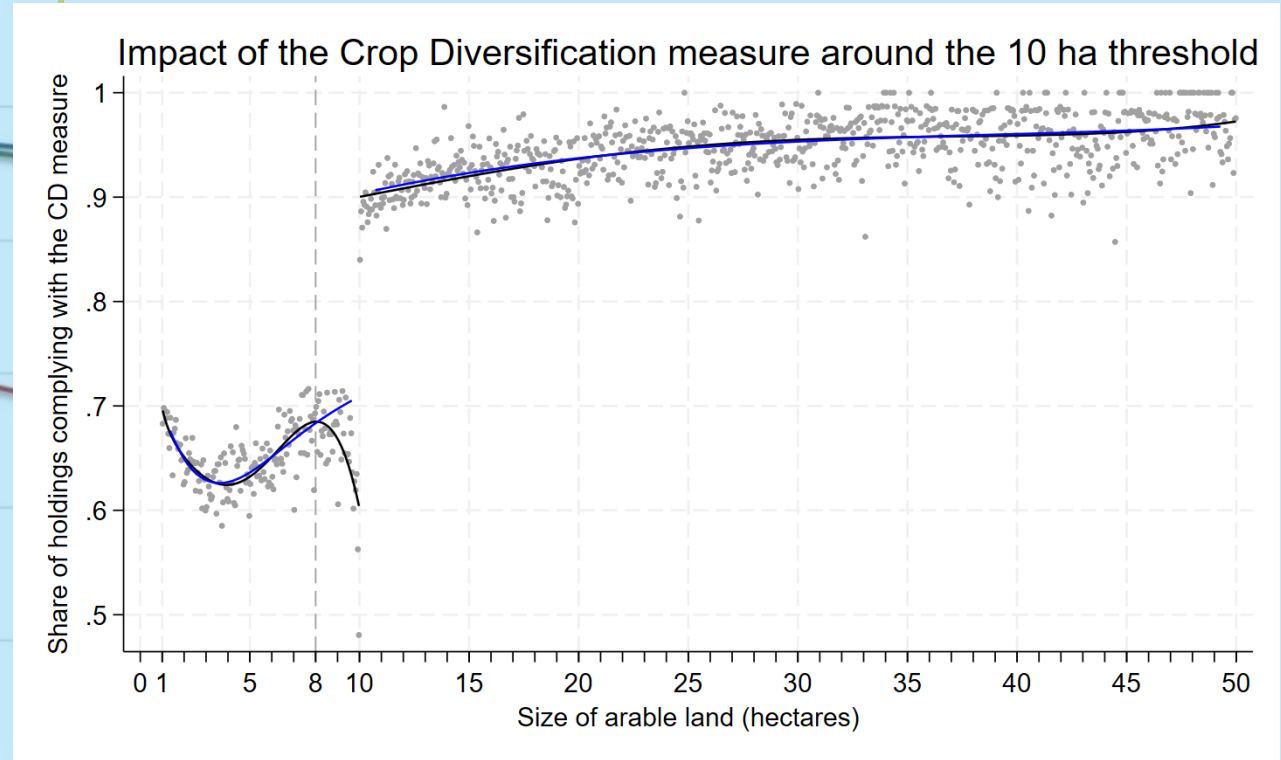
**168** species  
**30** countries  
**43** years  
(1980–2022)

[www.pecbms.info](http://www.pecbms.info)

European Comm



## Estimation of the policy effect (env outcomes) correcting for bunching



# Thank you



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[zelda.brutti@ec.europa.eu](mailto:zelda.brutti@ec.europa.eu)

## Competence Centre on Microeconomic Evaluation

[EC-CC-ME@ec.europa.eu](mailto:EC-CC-ME@ec.europa.eu)

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