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Are organic farms fitter? Efficiency and resilience indicators of conventional and organic dairy farms across Europe

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Introduction

- GenTORE aims at improving resilience and efficiency of cattle by phenotype- to genomic approaches
- Within GenTORE, we built a database describing the regional socio-economic environment of dairy production (farm typology)
- The database functions as the Environment for GxE predictions within the project.
- As a «by-product» the data are directly anaylsed with respect to R&E of dairy farms.
- One aspect is the impact of organic certification.

Data

- FADN data from 2011to 2013 used for the study
- Approximately 40,000 dairy farms across 25 EU countries
- Information on input costs and output / revenues
- Information on farm characteristics (certification, assets, area, subsidies, specialisation, etc.)

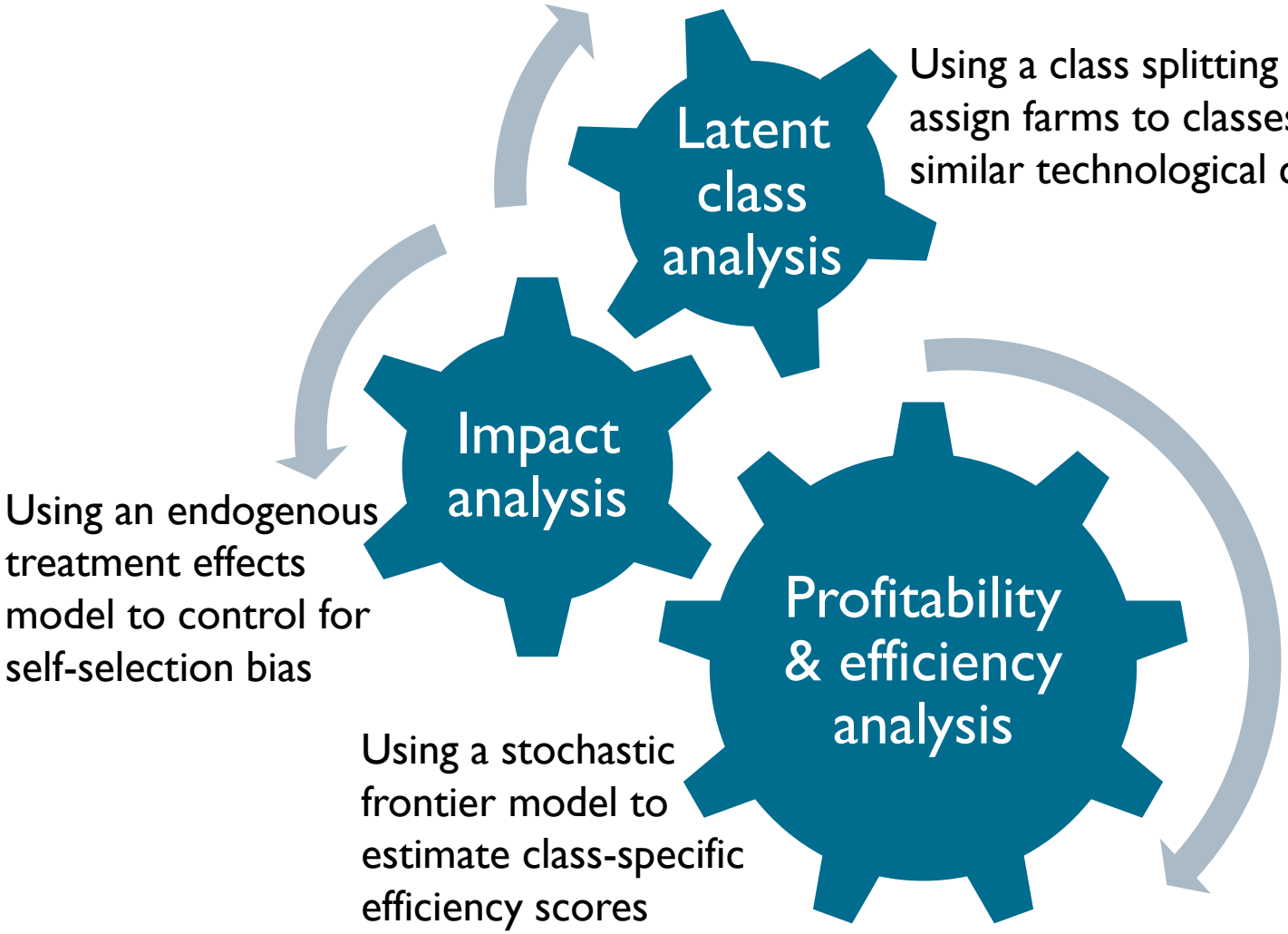
R & E definition

According to M 1.2

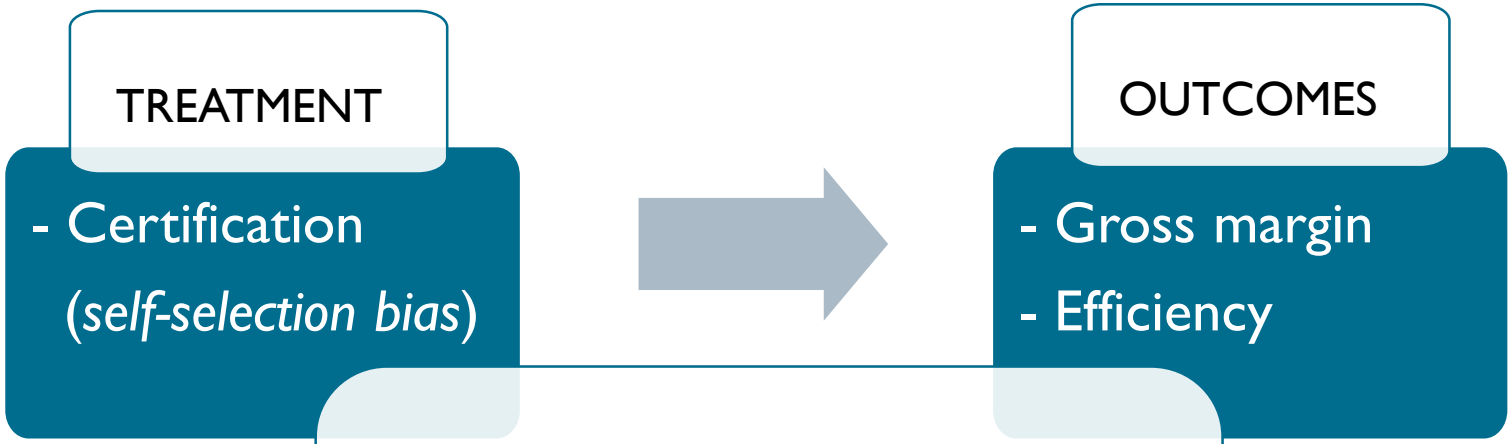
- **Efficiency** is the economic situation (in a broad sense) at a certain time point.
- **Resilience** is the response of economic situation to a changing gradient (e.g. climatic change, wheat price increase, milk price decrease etc)

«Resilience = Efficiency in time»

Methodology - Elements



Impact analysis – endogenous treatment model



- Controlling for observable confounders (e.g. farm size, assets, family labour) and unobservables (e.g. entrepreneurship)
- Using permanent fallow as instrument (no influence on outcome)
- Testing for validity of instrument and of model specification

Selected variables - average values by class & certification

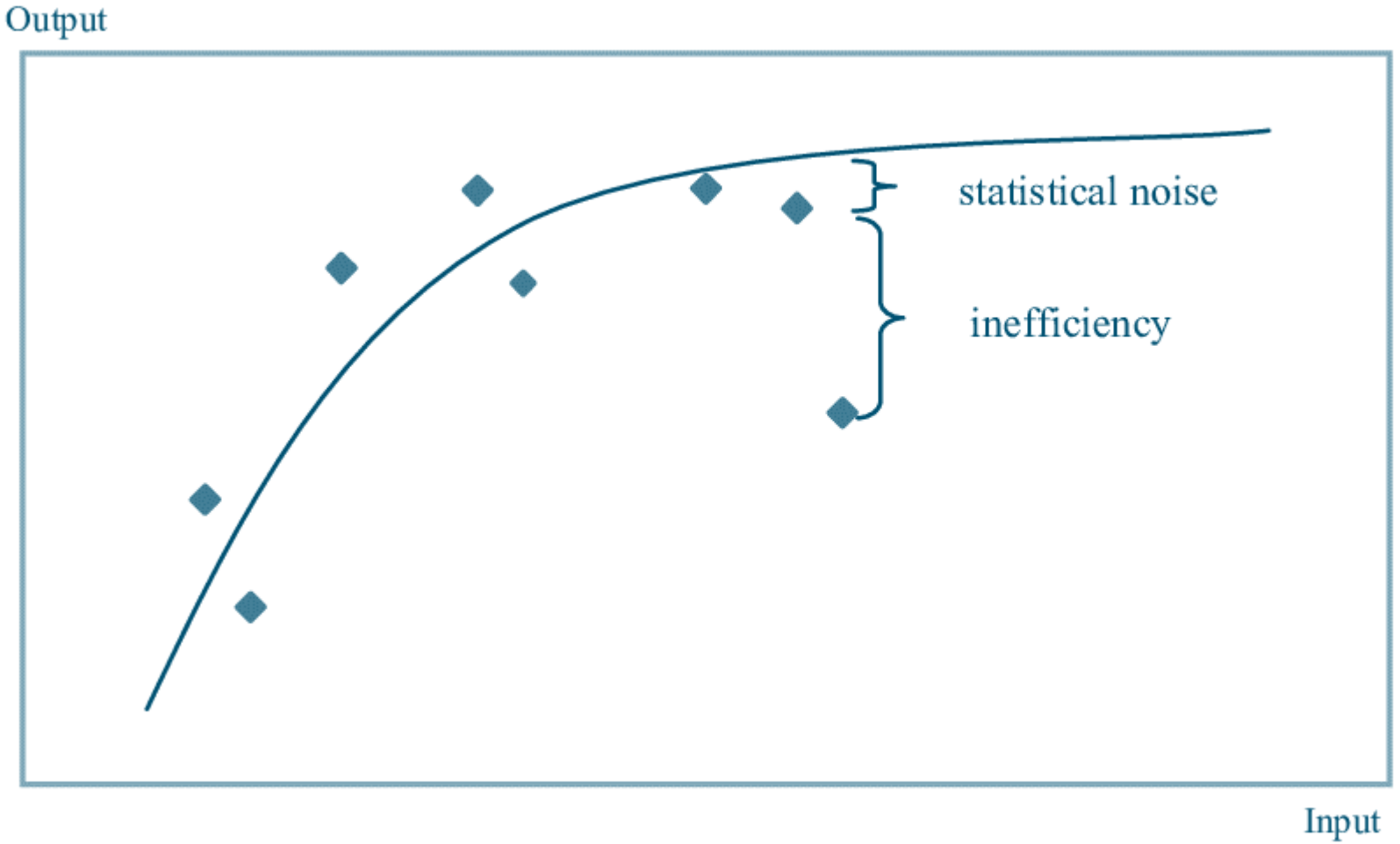
	Class 1		Class 2		Class 3		Class 4	
Org. certification	No	Yes	No	Yes	No	Yes	No	Yes
Description	Dairy farming under cool conditions (mainly Scandinavian and Baltic farms)		More intensive dairy farming under temperate conditions (mainly Central European farms)		More extensive dairy farming under temperate conditions (mainly Central European farms)		Dairy farming under warm conditions (mainly Mediterranean farms)	
Farms (#)	4,311	933	20,616	812	8,863	391	4,392	92
Revenues (€/cow)	2,628	2,596	2,542	2,742	1,486	1,688	2,507	2,707
Feed costs (€/cow)	1179	1033	776	854	440	354	1235	1309
Mach. costs (€/cow)	217	252	167	216	82	142	70	49
Other costs (€/cow)	348	378	360	406	105	137	178	143
Farm size (ha)	186	111	169	163	36	38	33	51
Stocking d. (cows/ha)	1.11	0.87	2.02	1.44	2.08	1.20	9.65	3.35
Assets (€)	1,842	2,198	1,323	1,733	1,513	2,024	693	584
Forage area (ha)	131.94	94.72	103.78	123.44	21.77	30.24	28.48	46.57
Specialisation (%)	0.66	0.61	0.67	0.68	0.62	0.59	0.75	0.68

Profitability analysis – gross margin calculation

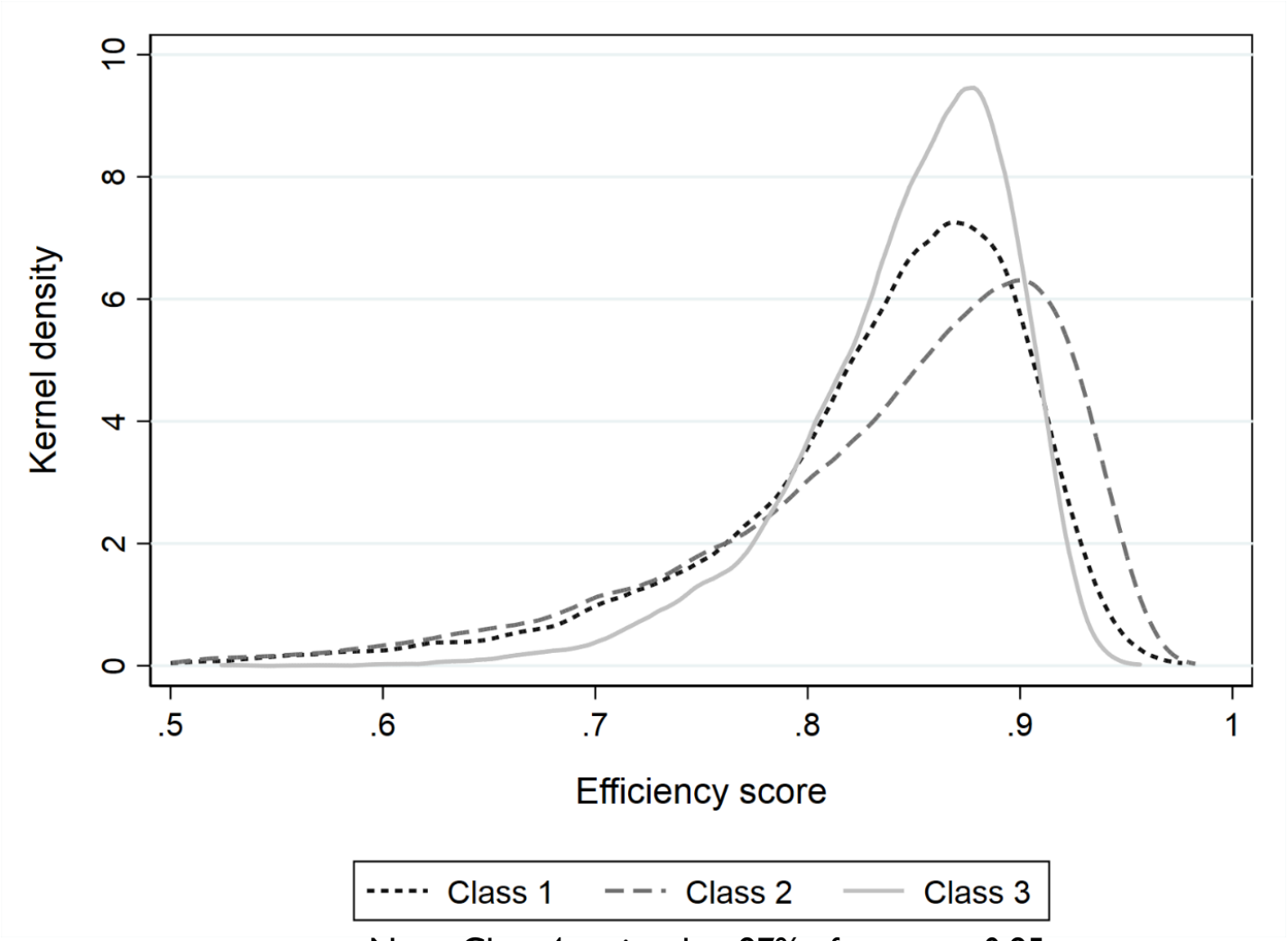
Per cow values for sales revenues and variable input costs

GM = sales revenues – (labour costs + feed costs + forage costs + machinery costs + other variable costs)

Efficiency analysis – stochastic frontier model

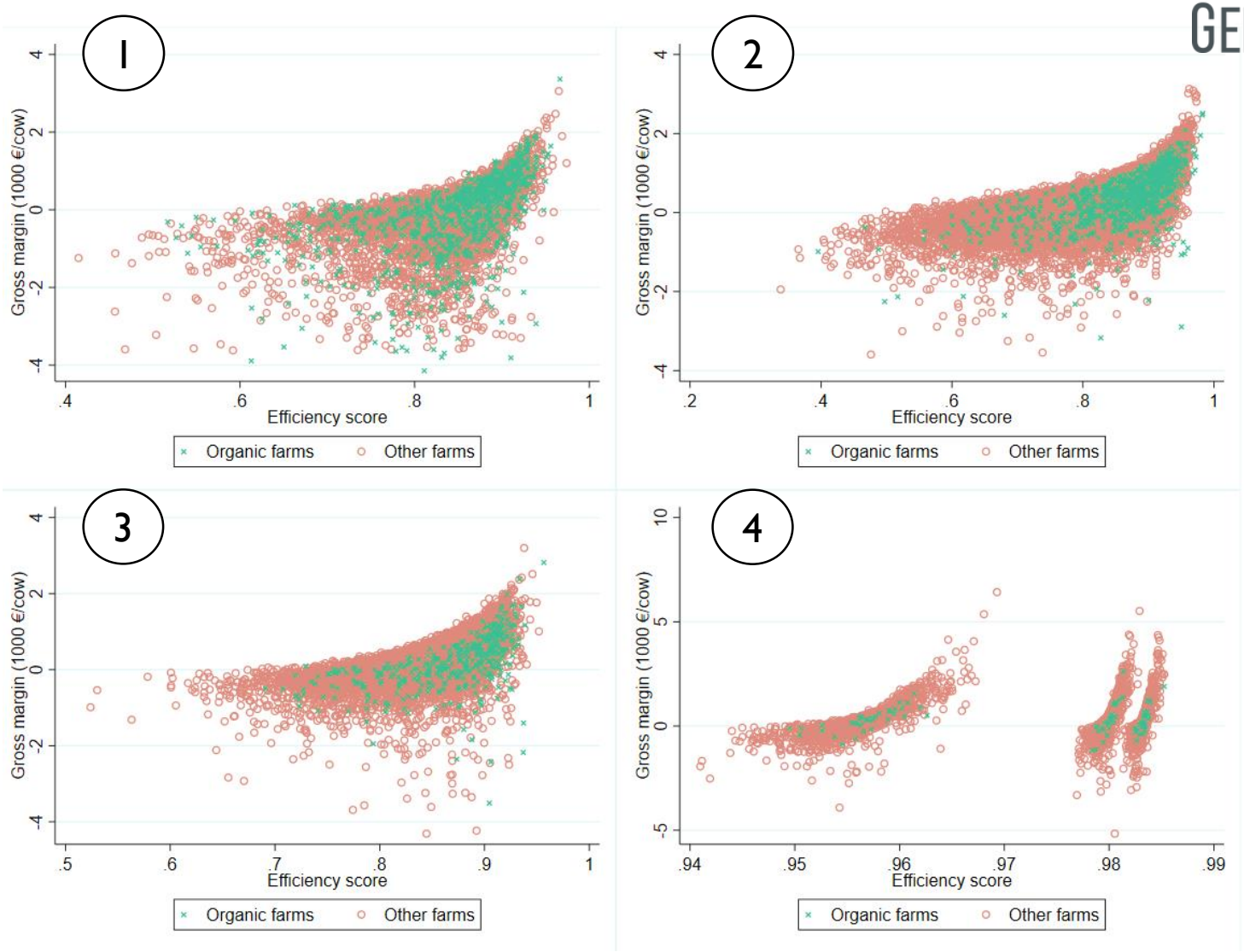


Distribution of efficiency scores



Note: Class 4 omitted as 97% of scores > 0.95

Profitability & efficiency – a banana relationship

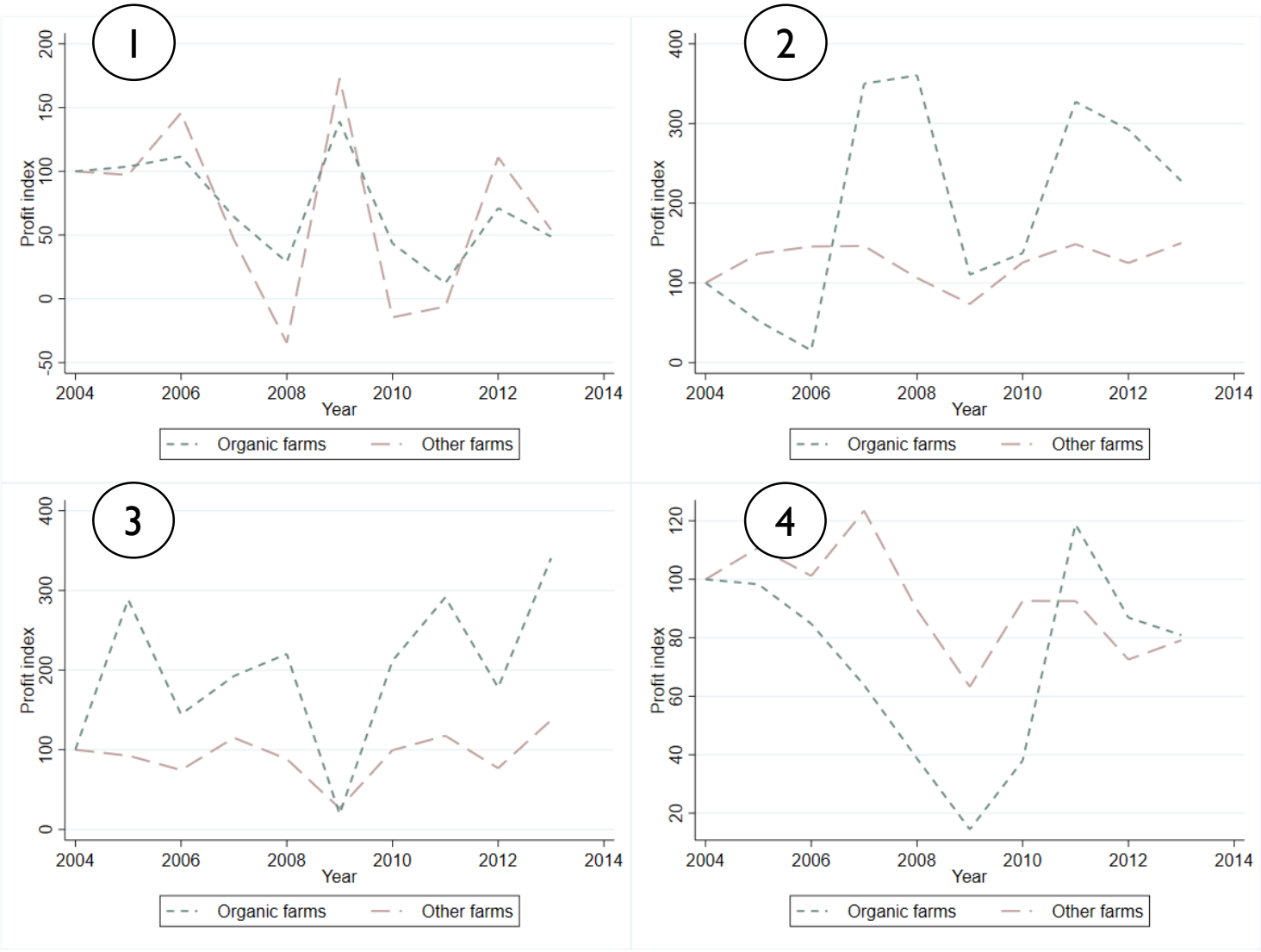


Impact estimates - Endogenous treatment model

	Class 1		Class 2		Class 3		Class 4	
	GM (€/cow)	EFF (0-1)	GM (€/cow)	EFF (0-1)	GM (€/cow)	EFF (0-1)	GM (€/cow)	EFF (0-1)
ATT	92	0.023	169	0.037	172	0.028	394	0.000
PO mean	-243	0.829	409	0.836	244	0.846	267	0.973
% change	30%	3%	41%	4%	70%	3%	148%	0%
Sig.	**	**	***	***	***	***	***	ns
N	5244		21,428		9,254		4,484	

GM = Gross Margin; EFF = Efficiency; ATT = Average treatment effect on the treated; PO Mean = Potential outcome mean; Wald test = Test for model validity

Time trends – economic resilience



Class-specific average trendlines of dairy farm profits aggregated by nuts2 regions

Prices adjusted for inflation

Index with base year 2004 set at 100

Conclusion

Across all four environmental classes, organic certified dairy farms have (on average) slightly higher efficiency indices.

Profitability (gross margin) is always markedly better compared to the conventional peer farms.

Within time, certified farms gained more profits in the two largest regional classes, but «robustness» was low.

Conventional farms appear to be robust average, while organic farms represent often high performance with low robustness, but good resilience.

Data are about to be analysed with higher resolution, regressed against regional economic and climatic gradients.

GenTORE *@GenTORE_H2020*

Genomic management Tools to Optimise Resilience and Efficiency

THANK YOU

FOR YOUR ATTENTION!

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