The Matching methodology in agricultural economics: applications from Austria

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Doctorial thesis
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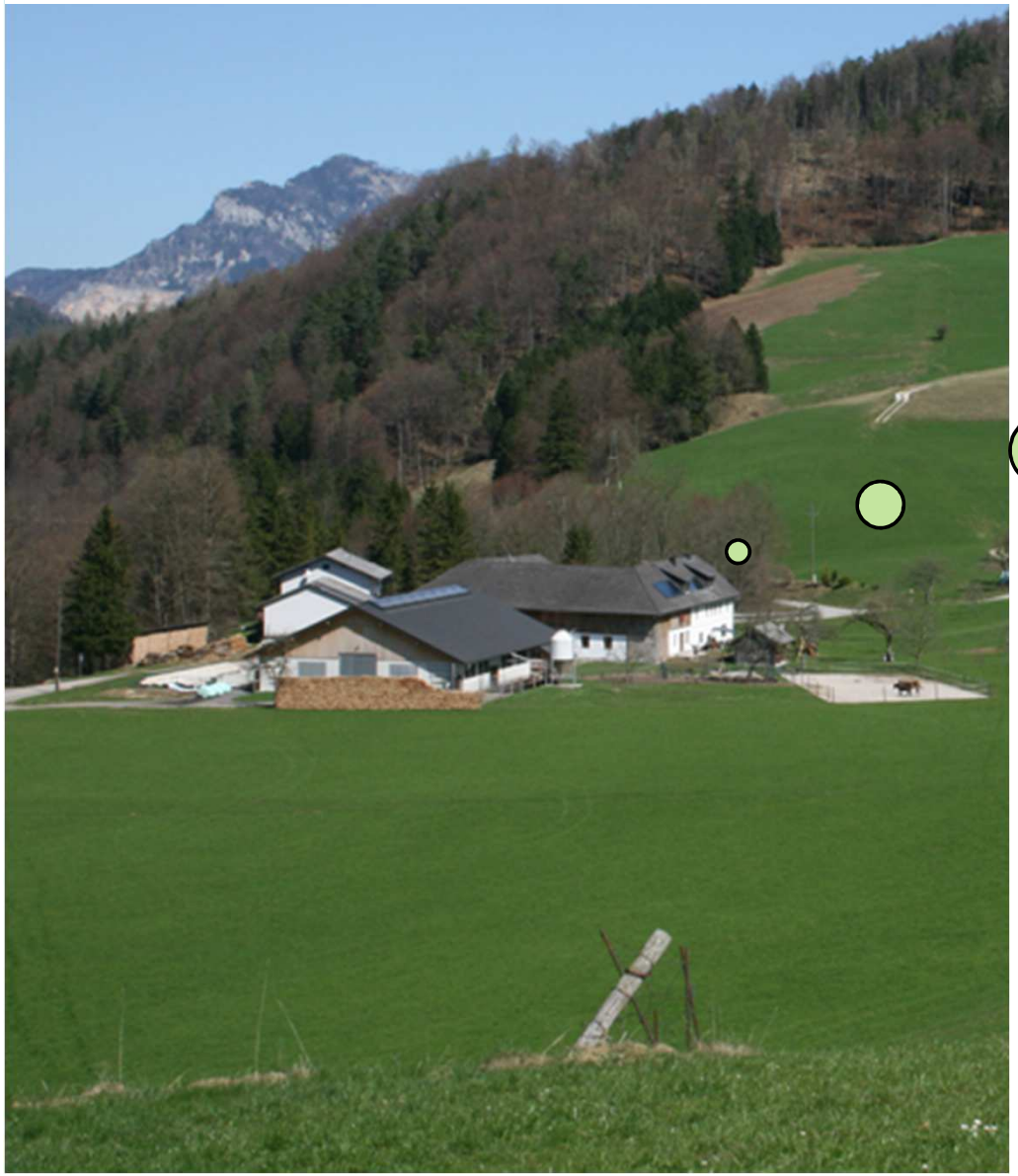
Farmers make decisions like…



- Support measures
- Investments
- Agro-tourism
- Organic farming,….

- Causal effects for agriculture and society
- Application of the **Matching methodology**
  (e.g. Pufahl and Weiss, 2009; Mayen et al., 2010; Michalek, 2012; Takahashi and Barrett, 2014; Datta, 2015; Shete and Rutten, 2015; Villano et al., 2015;…)

Matching is based on…

Objectives

- Estimating effects of **supported farm-investments** on **farm-economic** parameters
- Estimating effects of **supported farm-investments** on **structural** parameters and their dynamics
- Estimating effects of **low-input decisions** on **farm-economic** parameters

➢ Discussing the applicability of the Matching methodology for agricultural economic research questions and available data sets.

Basic model

Combining Matching with the difference-in-difference estimator (CDiD)

$$\tau \mid (T=1) = \sum_{A=1}^{n} (Y_{A,t}^{1} - Y_{A,t'}^{1}) \mid Z/n_A - \sum_{B=1}^{n} (Y_{B,t}^{0} - Y_{B,t'}^{0}) \mid Z/n_B$$

ATT_{CDiD}

Development (t‘ to t) of **investing** farms

Development (t‘ to t) of **non-investing** farms

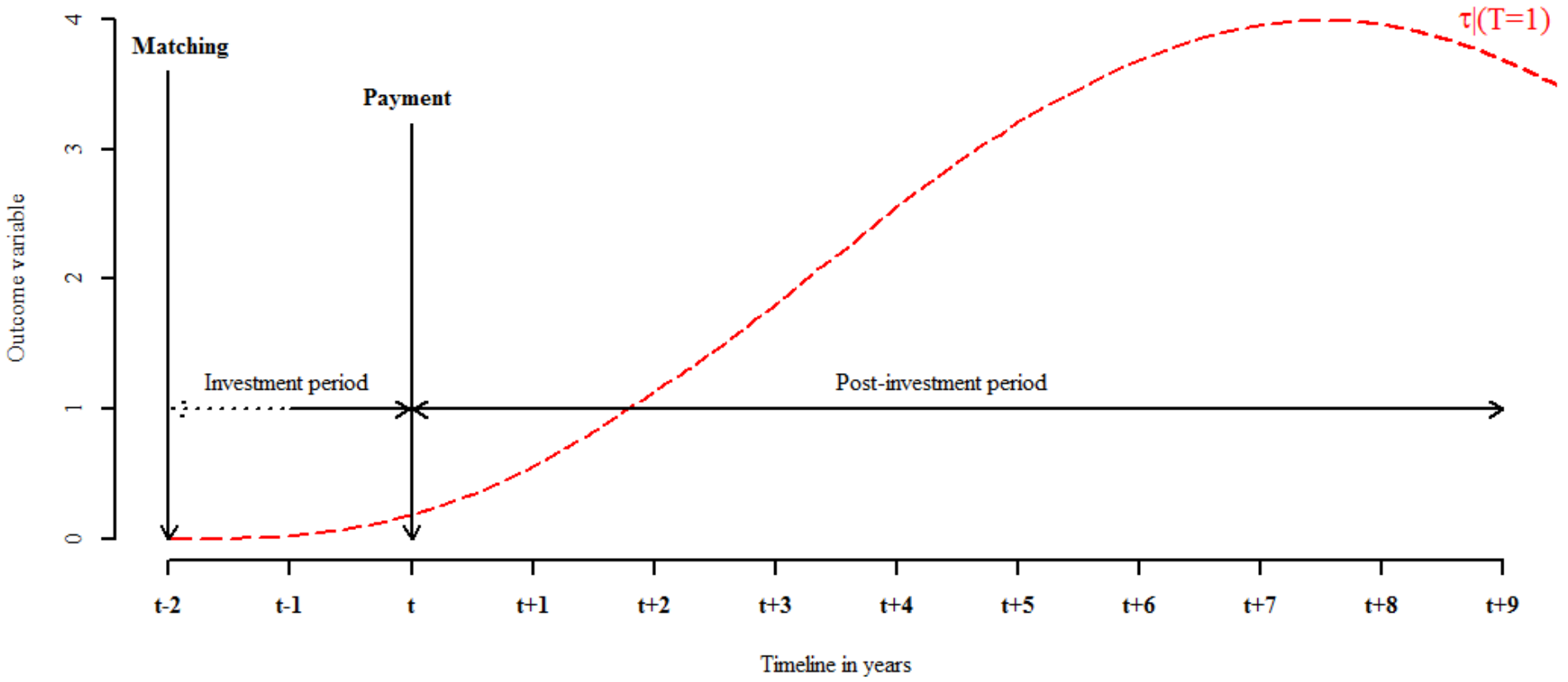
Being similar in observable characteristics (Z)

t' time before the investment; t' time after the investment

CDiD = Conditional difference-in-difference estimator; ATT= Average treatment effect on the treated;

Source: Kirchweger und Kantelhardt, 2015

Specific „dynamic“ model analysing the effects of supported investments

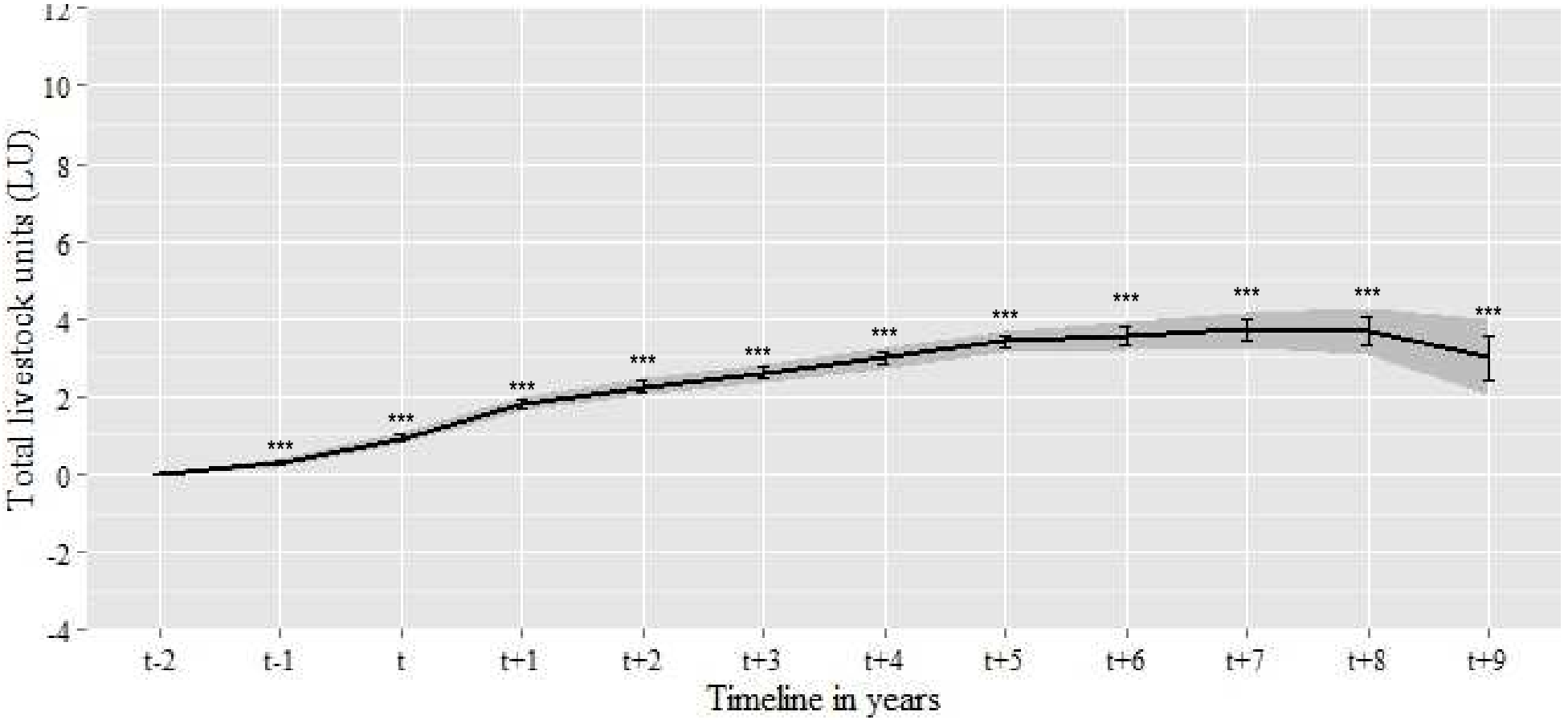


$\tau \mid (T = 1)$ = ATT = Development of investing farms – Development of non-investing farms

Source: Kirchweger und Kantelhardt, 2015

Selected results

Effects (ATT) of supported farm-investments on animal husbandry (LU) for **cattle farms**



= mean; ⌶ = standard error; ▒ = confidence interval

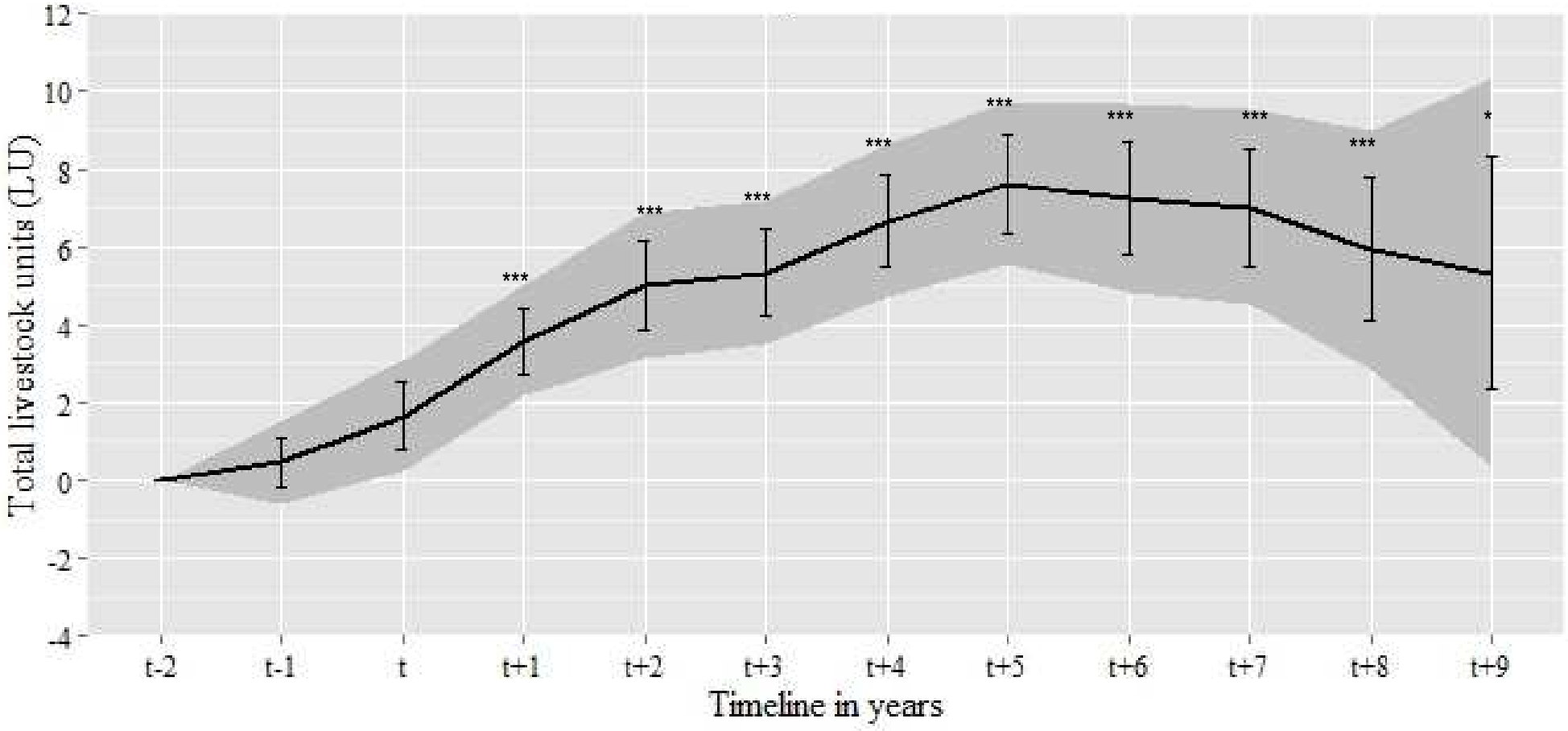
Number of farms: t-2 – t+5: 3507; t+6: 2466; t+7: 1892; t+8: 1263; t+9: 578

ATT= Average treatment effect on the treated; LU =Livestock unit; Signif. Codes (t-test): 0 '***' 0.001 '**' 0.01 '*' 0.05 ' ' 1;

Source: Kirchweger und Kantelhardt, 2015

Selected results

Effects (ATT) of supported farm-investments on animal husbandry (LU) for **pig farms**



= mean; ⊥ = standard error; ▒ = confidence interval

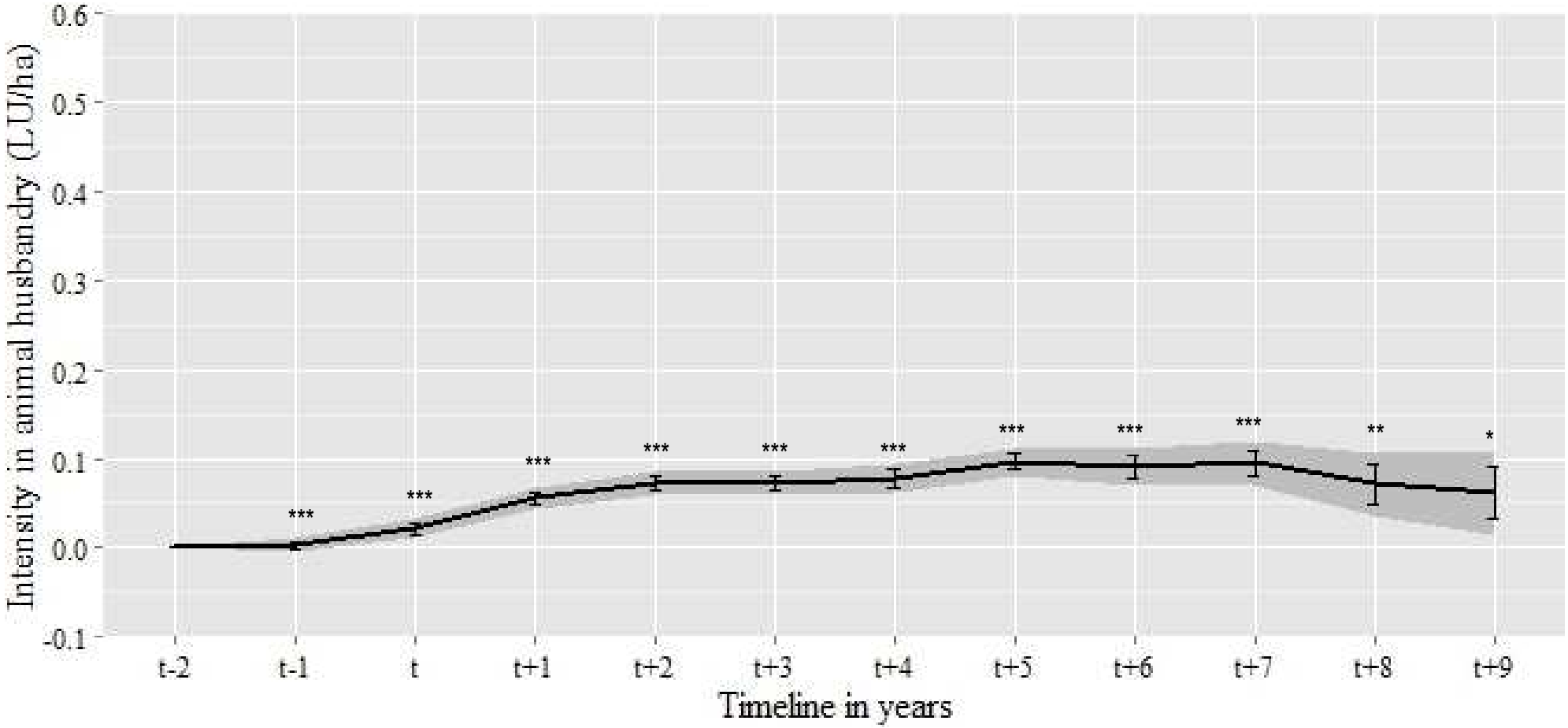
Number of farms: t-2 – t+5: 332; t+6: 258; t+7: 214; t+8: 159; t+9: 78

ATT= Average treatment effect on the treated; LU =Livestock unit; Signif. Codes (t-test): 0 '***' 0.001 '**' 0.01 '*' 0.05 ' ' 1;

Source: Kirchweger und Kantelhardt, 2015

Selected results

Effects (ATT) of supported farm-investments on intensity in animal husbandry (LU/ha) for **cattle farms**



= mean; ⌶ = standard error; = confidence interval

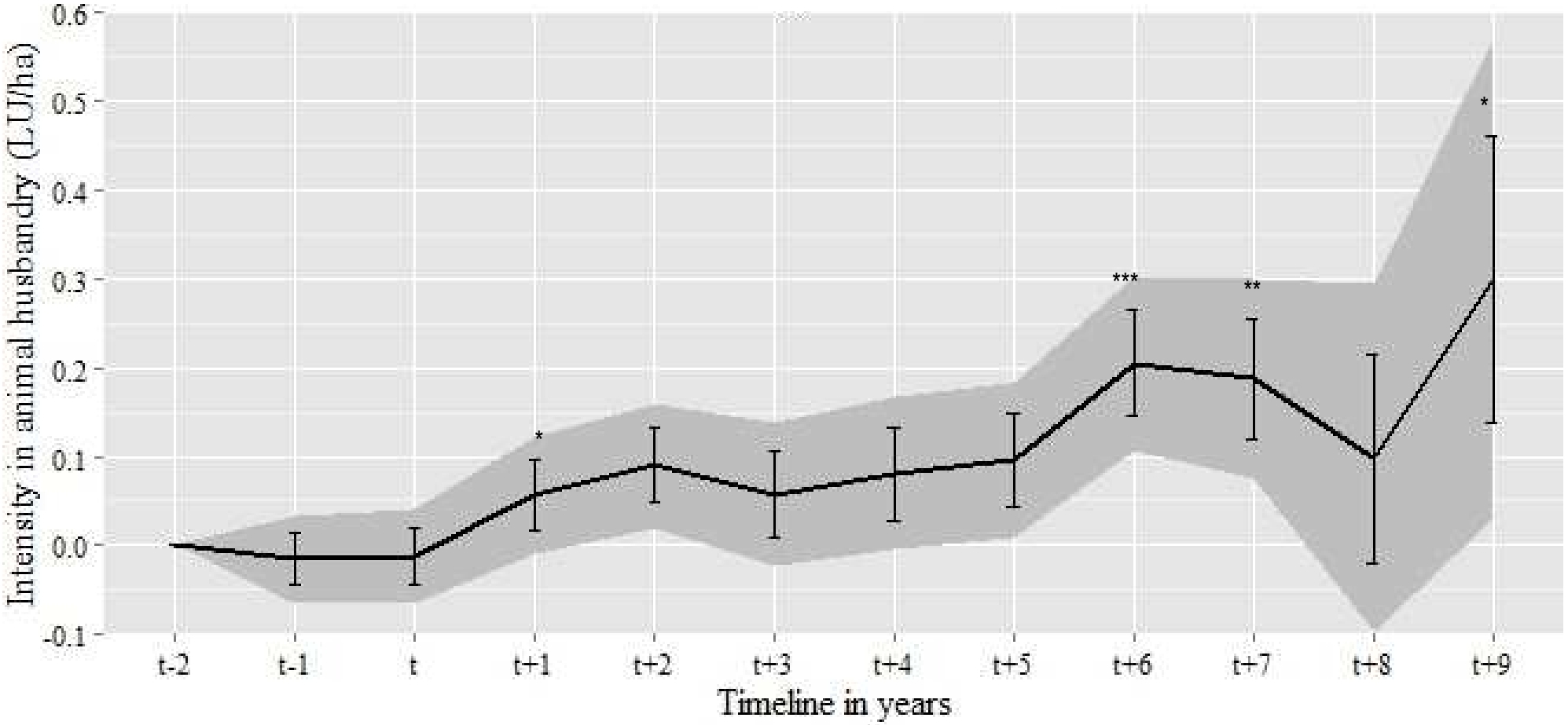
Number of farms: t-2 – t+5: 3507; t+6: 2466; t+7: 1892; t+8: 1263; t+9: 578

ATT= Average treatment effect on the treated; LU =Livestock unit; Signif. Codes (t-test): 0 '***' 0.001 '**' 0.01 '*' 0.05 ' ' 1;

Source: Kirchweger und Kantelhardt, 2015

Selected results

Effects (ATT) of supported farm-investments on intensity in animal husbandry (LU/ha) for **pig farms**



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Number of farms: t-2 – t+5: 332; t+6: 258; t+7: 214; t+8: 159; t+9: 78

ATT= Average treatment effect on the treated; LU =Livestock unit; Signif. Codes (t-test): 0 '***' 0.001 '**' 0.01 '*' 0.05 ' ' 1;

Source: Kirchweger und Kantelhardt, 2015

Conclusions I

The results of the supported investment analysis show…

- a significant increase in animal husbandry,
- but also in farming intensity (environment)
- and different effects depending on farm type and time.

Matching is especially applicable…

- when there are many control farms available
- and heterogeneous effects are expected (see also Lechner, 2002; Puhfal and Weiss, 2009)
- i.e. for analyses of supported investments or organic farming

Conclusions II

It has to be considered that …

- the matching methodology highly depends on observable variables,
- and decision making in agriculture is not always observable.

Further research is necessary …

- to understand agricultural decision making
- and in including other methods in such models.

Let‘s do the match!!!

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Published Papers:

Kirchweger, S., Kantelhardt, J., 2015. The dynamic effects of government-supported farm-investment activities on structural change in Austrian agriculture. ***Land Use Policy*** *48, 73-93*

Kirchweger, S., Kantelhardt, J., Leisch, F., 2015. Impacts on economic farm performance from government-supported investments in Austria. ***Agricultural Economics (Czech Republic)*** *61, 343-355.*

Kirchweger, S., Eder, M., Kantelhardt, J., 2014. Economic impacts of strategy selection in Austrian dairy farming: an empirical assessment. ***Proceedings of the 11th European IFSA Symposium*** *1- 4 April 2014 in Berlin, Germany 8.*

Moser, T., Kapfer, M., Sandbichler, M., Kirchweger, S., Kantelhardt, J., 2015. Effect of investment activities and investment support on economic parameters of dairy farms in Austria. ***Berichte über Landwirtschaft*** *93*