The effects of the investment support to agriculture in the CR

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Background

- Investment support an important instrument of the CAP
- The RDP 2007-2013 completed,
  - CZK 5360 million (€202 million) spent for investment supports
  - What are the effects?
- New RDP for 2014-2020
- The EC interested in investment support evaluation methods, particularly the counterfactual approaches. (Metis, 2014)

Backround cont.

- Our previous research (Medonos et al, 2012 and Ratinger et al, 2013):
  - Positive effects in terms of GVA and productivity
  - However the effects measured at the last year of the investment support (2010)
- In 2014 we worked with farms in FADN and assessed two years after the completed supported investment:
- Variable results, indication that there might be problem with matching (closeness of farms)

Objective

- Overall: to discuss the possible reasons for variability of results of the counterfactual approach based on matching (participating ←→ control farms). In turn it means
  - i) to investigate deeper the time consistency of the effects
 - ii) to provide a better insight in the similarity of farms and their counterfactuals.

Data

- Albertina (≈ 1300 farms for the period 2007-2013)
  - Bookkeeping data of legal entities
  - Land use and livestock data from MoA
  - Policy data from MoA (Paying agency – SZIF)
- FADN (≈ 600 farms for the period 2007-2012)
  - Bookkeeping, land use, production and policy data for all types of farms
  - ≈ 1/3 legal entities, 2/3 individual farms
 - Individual farms << legal entities

Approach

- We cannot have the same farm participating and staying aside the programme

- Instead we use as similar as control farms

- Propensity score matching (e.g. Kahandaker et al. 2010)

  – Probabilities of participating, non participating

- Mahalanobis metric matching (Abadie, Imbens, 2002)

  $||x||=(x'Vx)^{1/2}$, where x is a vector of structural variables and V is a positive semidefinite matrix.

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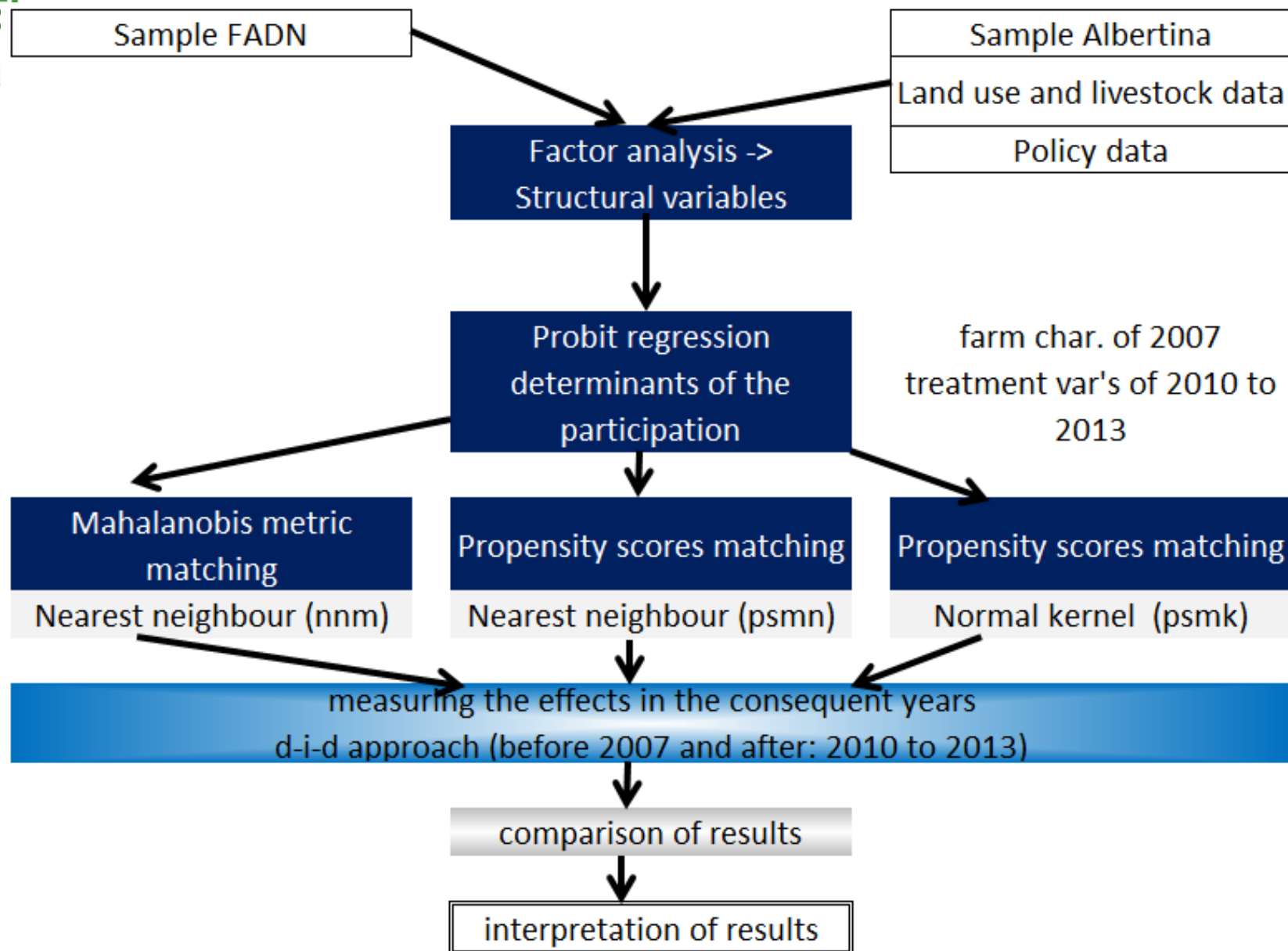
Investment activity of Czech farms
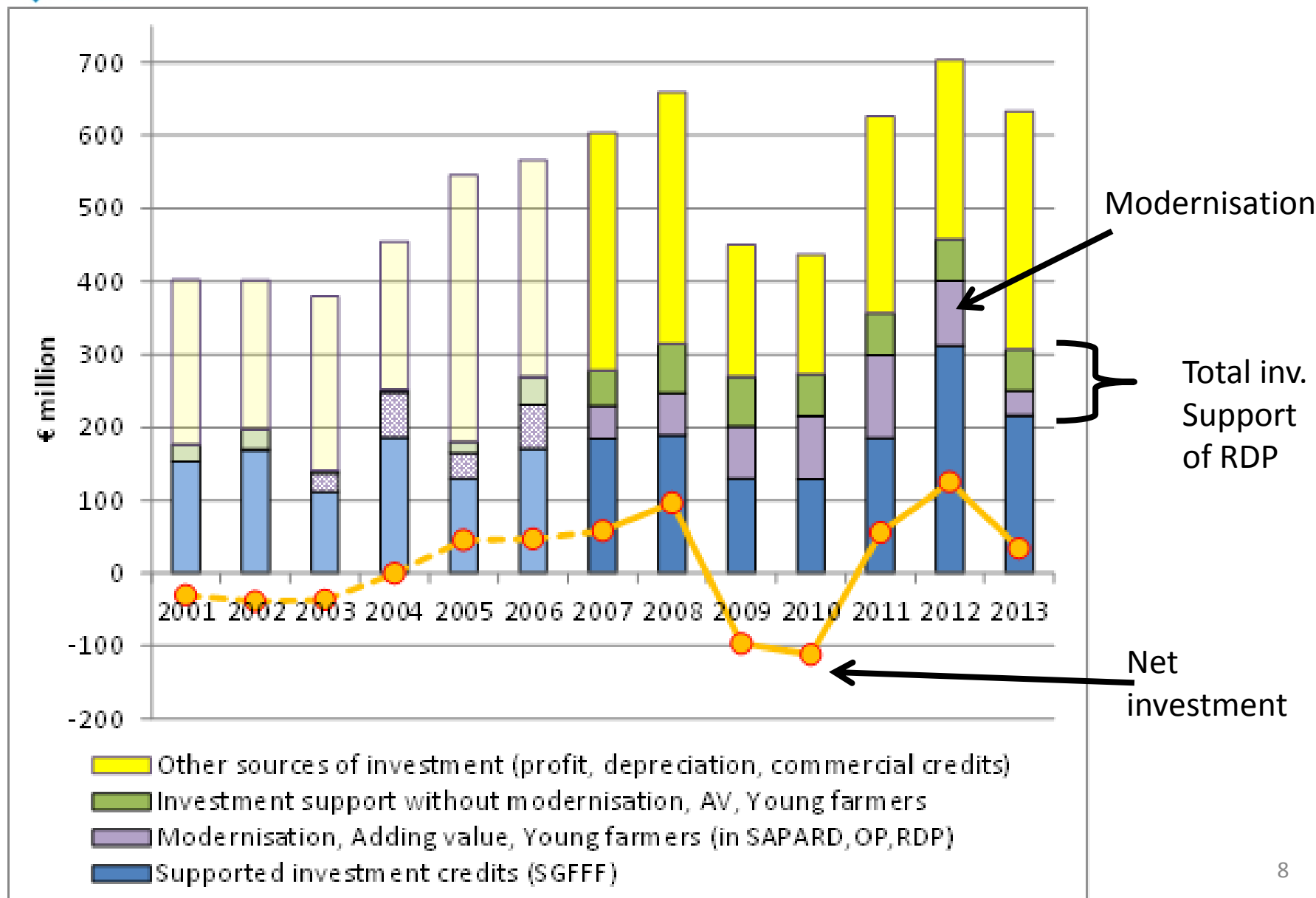
The rate of investment support

Code	Measure (farm type)	Rate of support
121	**Modernisation of agricultural holdings**	37,1%
121	Field Crops	38,9%
121	Milk (grazng livestock)	46,1%
121	Beef Cattle (grazng livestock)	36,7%
121	Mixed crop livestock	40,4%
121	Granivores	35,8%
121	Rest	38,2%

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Investment support in the analysis

- Albertina data base with 1069 projects covers 46% of the investment support spent on M121 of the Czech RDP 2007-2013

- M121 represents 60% of the investment support in the sample

- We present the analysis "Total investment support" and M121, believing that it provides sufficient picture

- We consider investment [support] periods 2007-2010, 2007-2011, 2007-2012, 2007-2013

- We exclude all farms which received support after the end of the investment period.
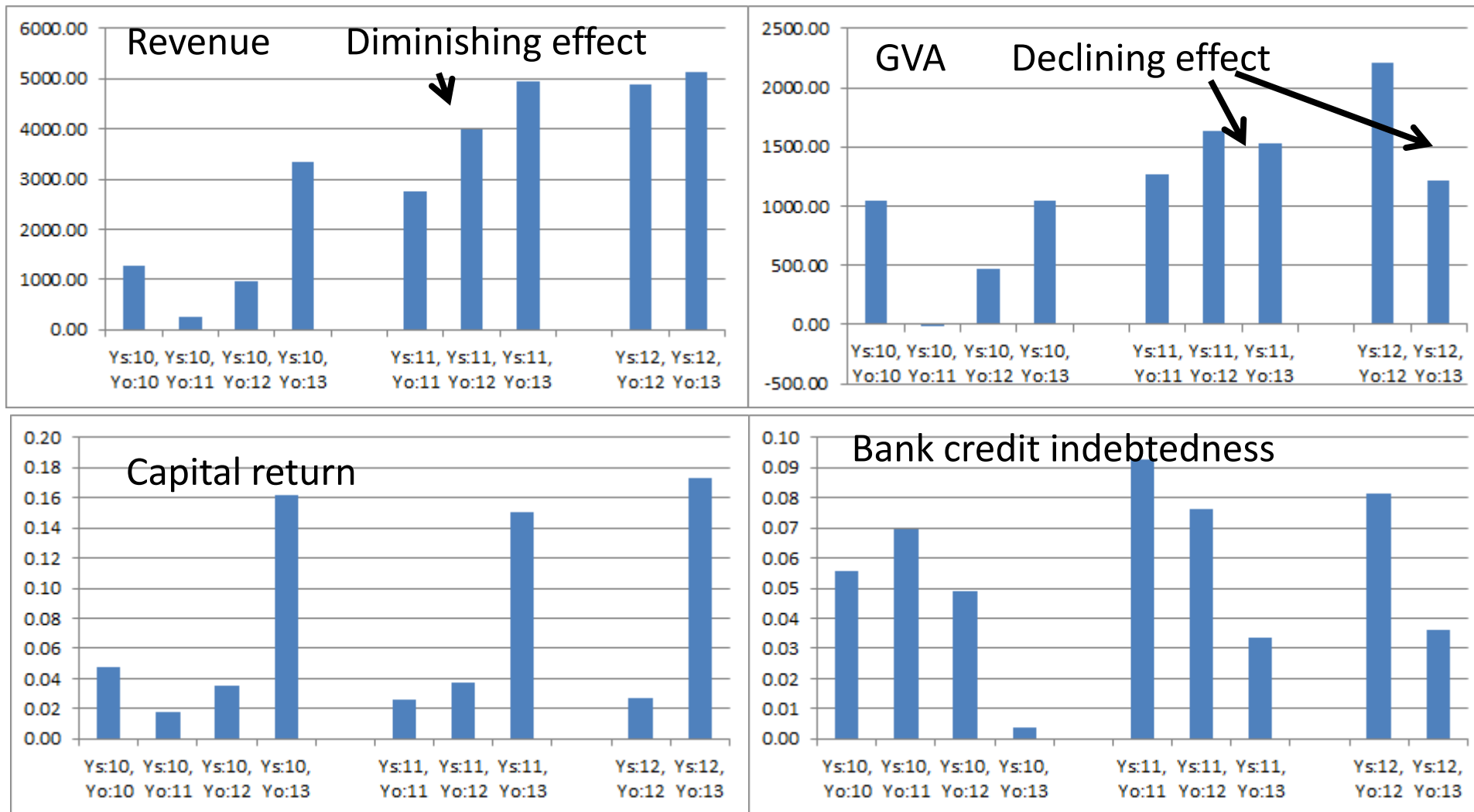
Results - structure

- Effect (att) through the time
- Effects (att) and samples
- Effects (att) and methods

Discussion

- Improving similarity
- Implications

- *We use primarily Mahalanobis metric matching, because we can assess statistical significance*

Mahalanobis metric matching

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Effects through time

- Comparing Revenue and GVA, farms expanded business, but efficiency gains were rather limited (declining over time)

- For Revenue and GVA, the development of effect depends on the period of considered investment support.

  – Farms which invested in the next year are included among treated in the next investment period → the sample increases

  – needed some additional investment to bring effects? (effects of longer investment period are bigger)
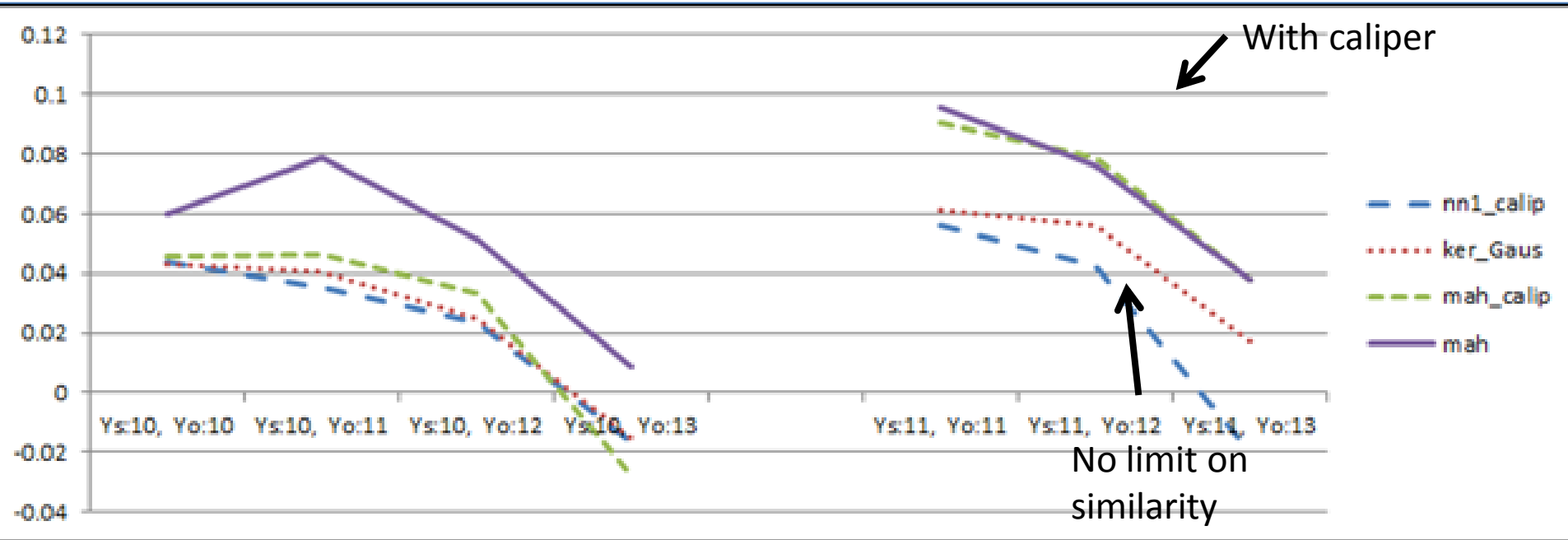
Samples matter
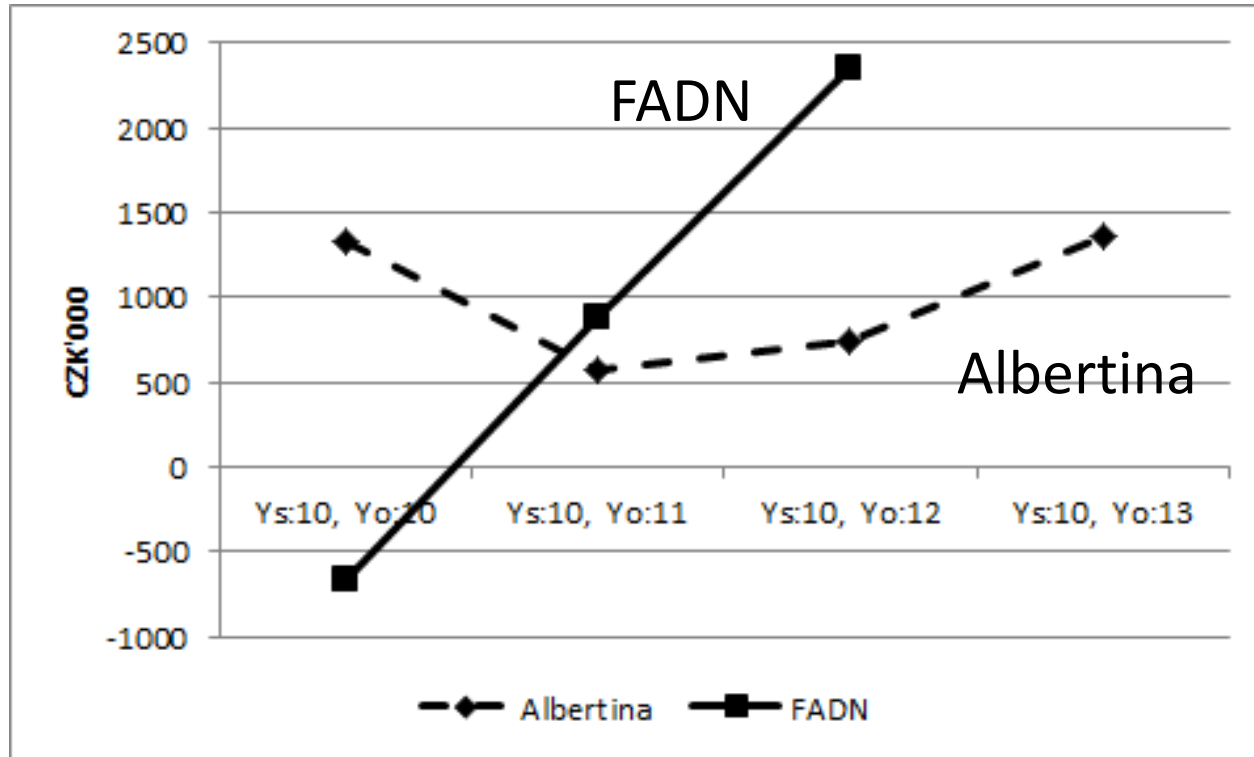
- Albertina: large sample, the same legal form, large farms
- FADN: shows what we expect

GVA d-i-d CZK'000
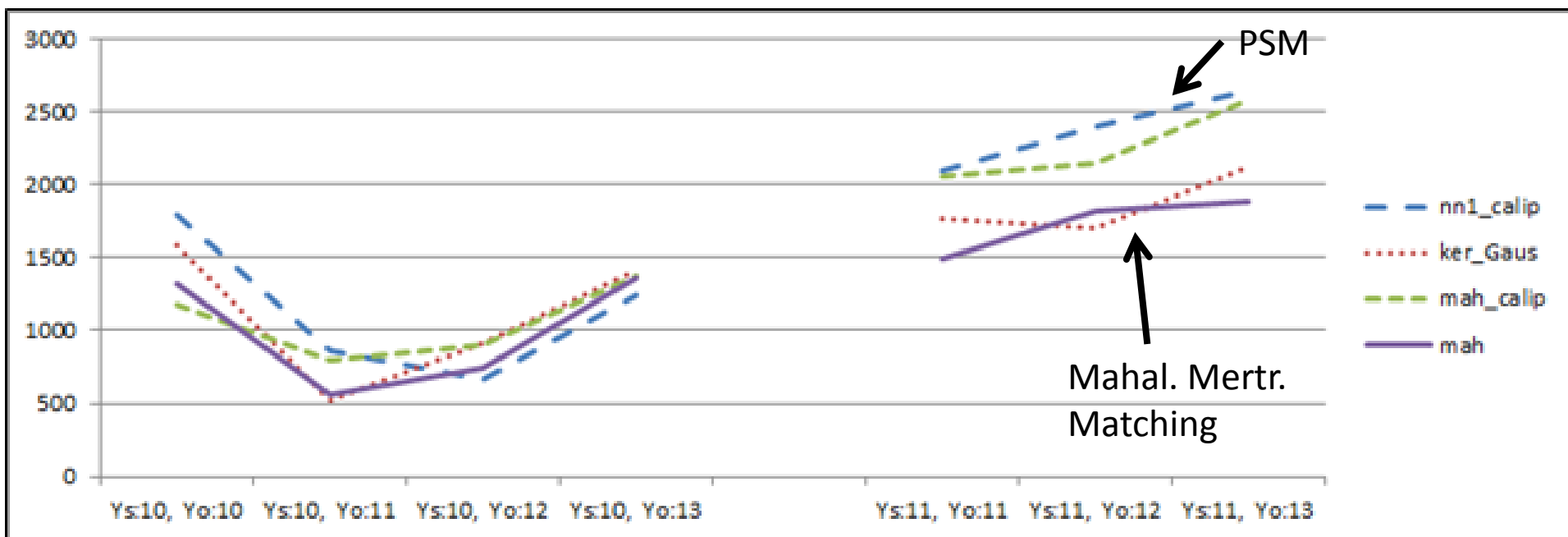
- In the first period the methods perform similarly, in the second period by the metric of similarity

Bank credit indebtedness d-i-d

- Strictness of similarity matters

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Discussion

- Our requirement is that farms should be similar in all available dimensions of their characteristics.

- Not always the case – e.g. size

- The nearest neighbour might be far
  - Need for addressing it

- Variance might be too high – how to control it?

Discussion - size

- It matters: particularly for Revenue and GVA
  - matched pairs differ by 14%-18% (relative to the average of the treated (participating) in 2007
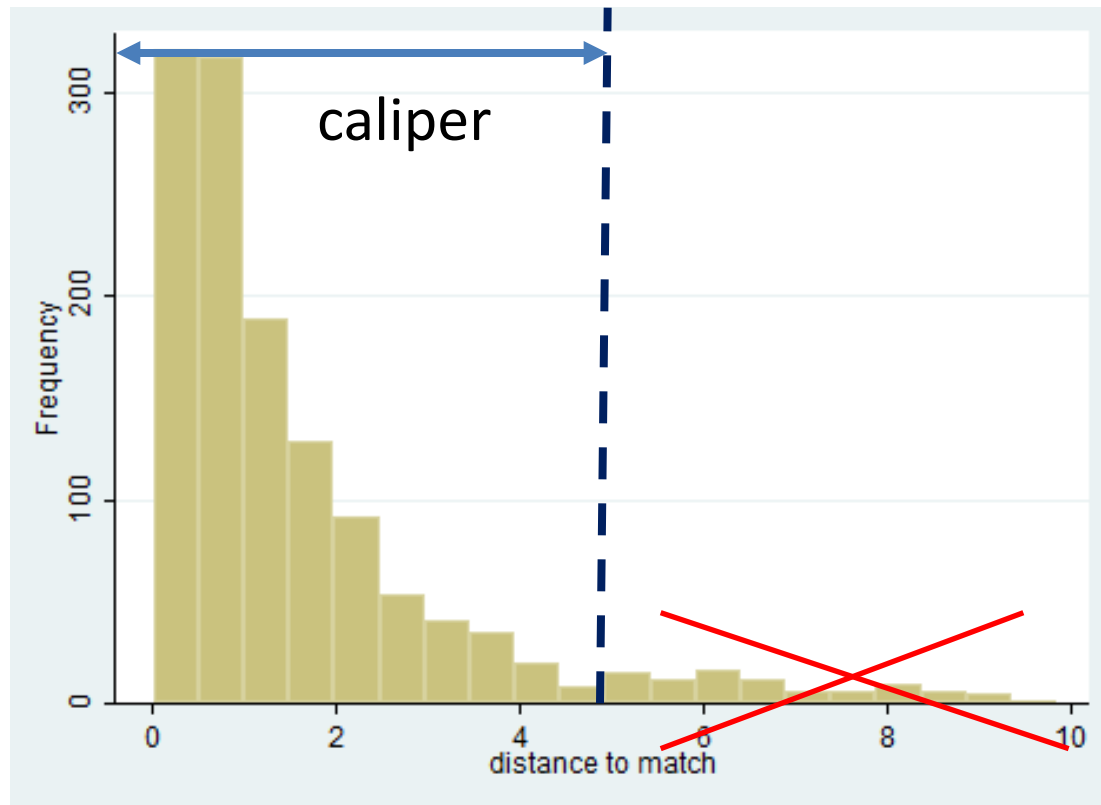 - d-i-d can well correct for it.
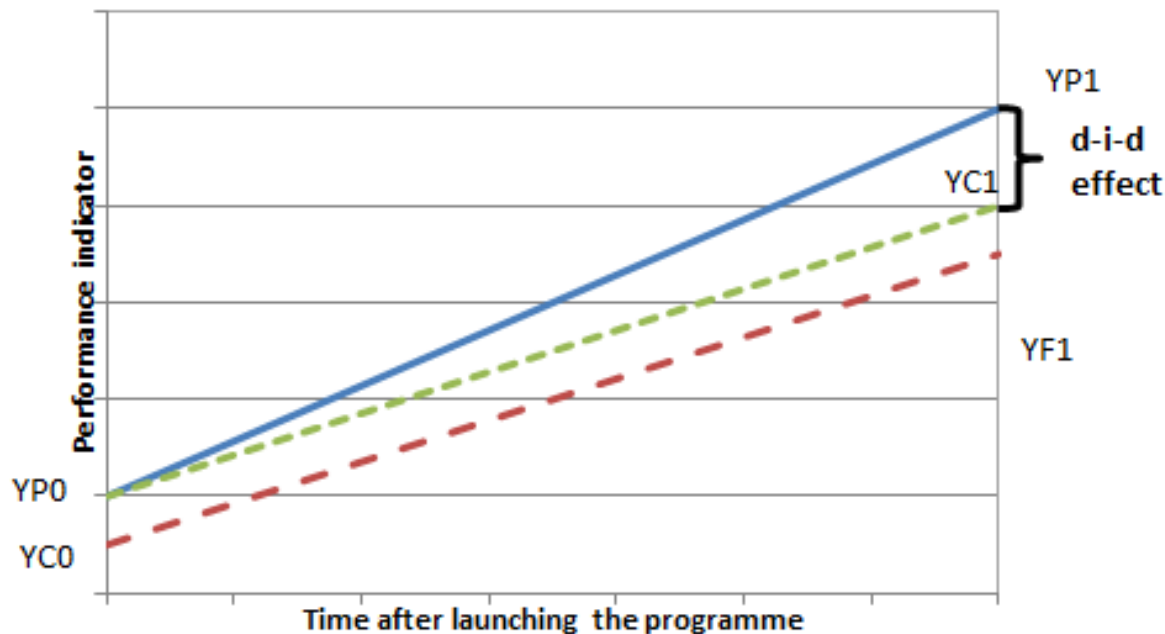
Discussion - distance
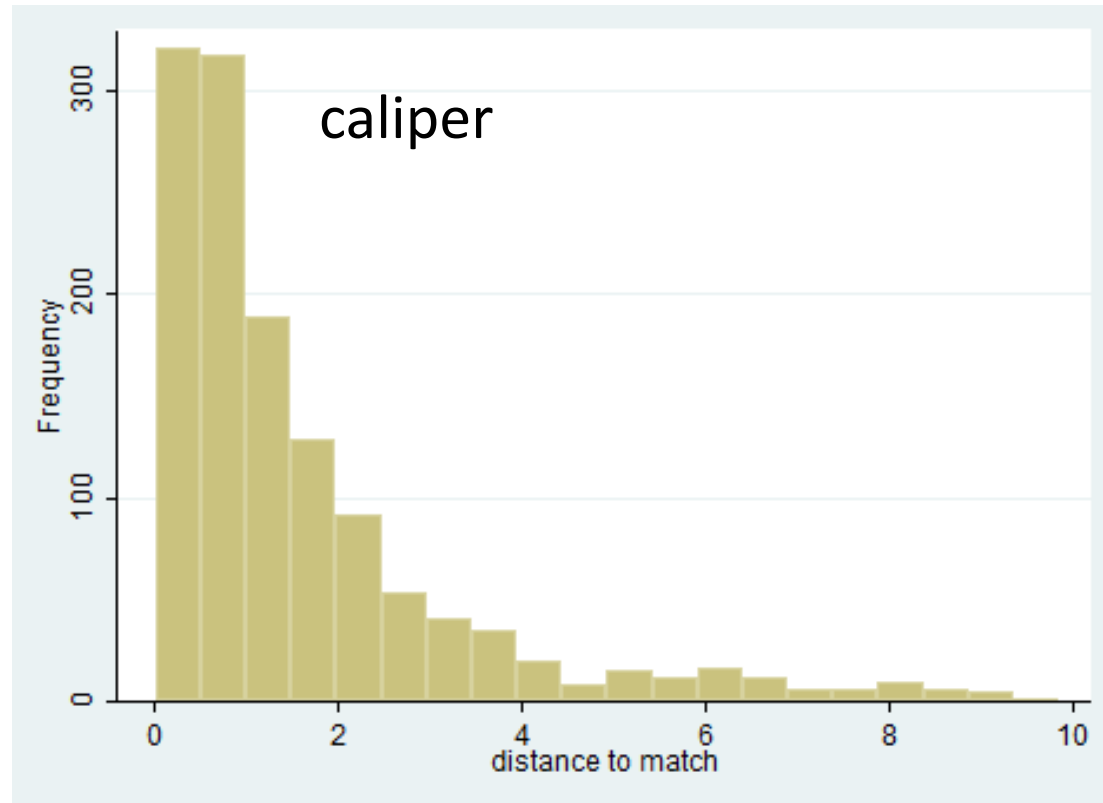
caliper

- The Mahalanobis distance between the treated farms, and the matched control ranges from 0.11 to 931.

Distribution of distances and caliper

- Lunt (2013) - a tighter caliper lead to greatly reduced bias and closer matches

The benefit of caliper

M121 - modernis	mah Ys:10, Yo:10		mah_calip Ys:10, Yo:10		mah Ys:10, Yo:11		mah_calip Ys:10, Yo:11		mah Ys:10, Yo:12		mah_calip Ys:10, Yo:12		mah Ys:10, Yo:13		mah_calip Ys:10, Yo:13	
2007-2010	att	sig.	att	sig.	att	sig.	att	sig.	att	sig.	att	sig.	att	sig.	att	sig.
Revenue	2718	**	1478		1736		1355		2357		1554		3931	*	3067	
GVA	1326	*	1183		565		795		746		898		1363		1375	
Capital Return	0.048	***	0.038		0.013		-0.013		0.030	**	0.023		0.296		0.002	
Bank Credit	0.060	***	0.046	*	0.079	***	0.046	*	0.052	***	0.033		0.009		-0.028	

M121 - modernis	mah Ys:11, Yo:11		mah_calip Ys:11, Yo:11		mah Ys:11, Yo:12		mah_calip Ys:11, Yo:12		mah Ys:11, Yo:13		mah_calip Ys:11, Yo:13	
2007-2011	att	sig.	att	sig.	att	sig.	att	sig.	att	sig.	att	sig.
Revenue	3408	**	4679	**	4524	**	4884	**	5254	***	5794	**
GVA	1492	**	2056	**	1815	**	2146	**	1891	**	2581	**
Capital Return	0.019		0.024		0.034	***	0.041	**	0.272		0.028	
Bank Credit	0.095	***	0.090	***	0.076	***	0.078	***	0.038	*	0.038	

- For GVA - the effects (att) are bigger with caliper
- Similar results for PSM nn

Conclusions

- there are significant effects of the invest. support of the RDP 2007-2013 in terms of
  - production expansion,
  - GVA improvement and
  - mobilisation of additional financial sources of banks.
- It is also evident that effects tend to decline already shortly (one or two years) after the project is completed
- There are some problems with the application of matching methods (counterfactual analysis)
  - To achieve acceptable similarity of the treated and control farms - introducing caliper can help
  - Large variance or heteroscedasticity – Mahalanobis metric matching with a control for standard error robustness (Abadie, Imbens, 2002)
  - Lack of robustness in respect to samples

Conclusions

- Not easy to use it in evaluation practice (it cannot be a routine, it must be research)

- Thank you for your attention