

The assessment of the effects of the investment support scheme in the Czech Republic

Tomáš Medonos, Tomáš Rätinger,
Martin Hruška



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Structure of presentation

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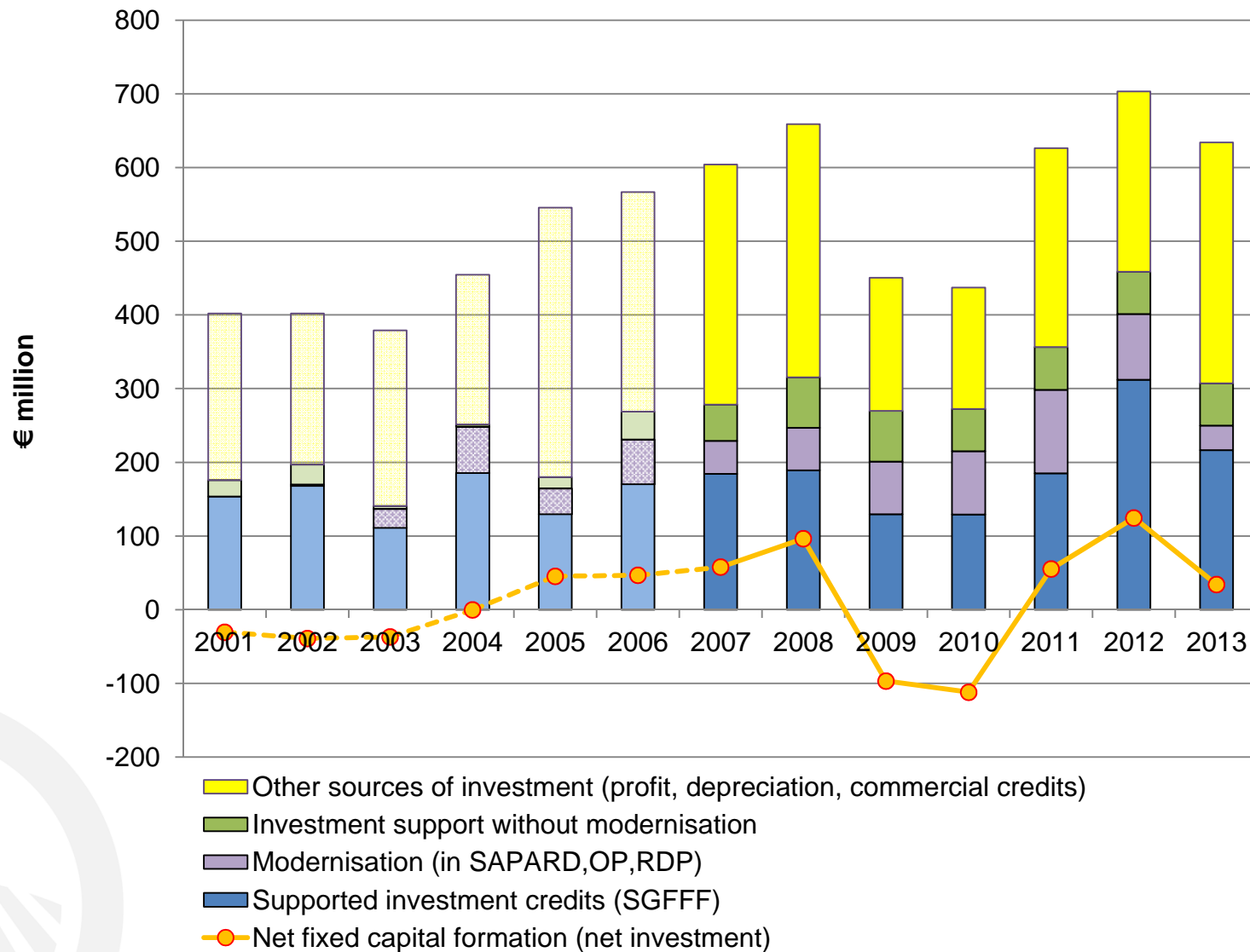
Objectives

- To identify factors of participation in investment support scheme on the Czech farms
- To assess economic effects of the measures 121 „Modernisation of Agricultural holdings“ and 123 “Increasing of value added” of RDP 2007-2013
 - To quantify real causal effects of investment support with counterfactual situation on supported farms in their performance
- A comparison of results by matching methods, different periods of participation and different production specialisation

Motivation of the research

- Investment support as a principal vehicle for enhancing of competitiveness of agriculture during economic transition:
 - Direct investment support for individual farms
 - Providing of supported credits with guarantee (SGFFF)
 - Development programmes with EU accession – SAPARD, OP, RDP
- Little attention to the evaluation of effects of support programmes:
 - Success of interest subsidies for inv. credits – justified by high participation rate and improved level of fixed capital formation
 - Need for more rigorous assessment arrived with EU RDP
- Quantitative indicators for the programme assessment (CMEF-EC 2006):
 - structured according to concept of Intervention Logic – In,O,R,Im
 - 2 serious problems:
 - Impossible to associate result/impact indicators (GVA/GDP) with policy intervention
 - Policy measures targeted to some groups of producers – simple comparison supported and non-supported groups is problematic


Investments in agriculture 2001-2013



Structural changes in the sector

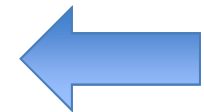
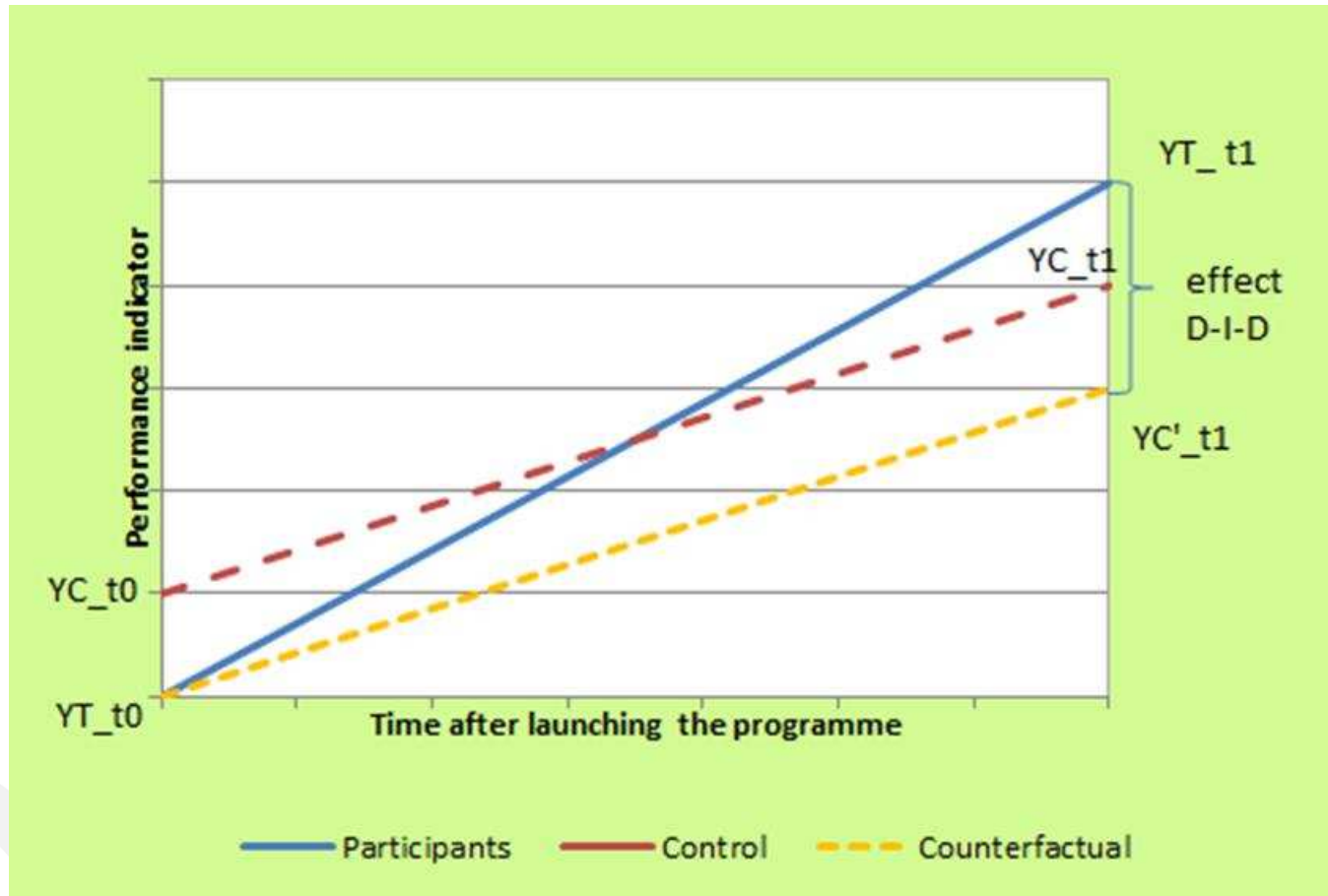
- Growing specialisation in field crops in good soil and climatic conditions;
- Growing concentration of dairy cow herds not necessarily in specialised dairy farms;
- Pig production has left common farms – it is concentrated in big specialised pig production companies X overall pork meat production declined dramatically over the last decade by 50%;
- Beef cattle emerged on mountain and sub-mountain grasslands (product of policy, market opportunities determine the intensity).

Methodology

- Counterfactual approach (Roy-Rubin model)
 - What would have happened if the supported producers did not participate in the programme and then comparing the result indicators 
- Matching based on approach (nnmatch)
 - For choosing or constructing control farm with identical characteristics from the pool of non-participating producer
 - originally - PSM (sample extension – increasing of variability and heteroscedasticity)
 - „nnmatch“ Abadie & Imbens (2002)
 - permits direct estimate of effect variance + treats its variability
 - contra-factual = aver. ≥ 1 the nearest neighbours (4)

Methodology

- Idea of counter-factual approach



Data

- **Albertina database:**
 - In period 2007-11 balanced panel data for 1460 farms
 - Corporate farms with commitment to present balance sheets and income statements
- **LPIS database, Animal register:**
 - Data about utilised agricultural area, share of grassland
 - Data about structure of animals
- **Database of Ministry of Agriculture:**
 - From farms in balanced panel of that
 - 549 participated in measure 121
 - 15 only participated in measure 123
 - more than 60 structural or financial variables

Variables of participation

- Using **factor analysis (PCM)** we identified 13 clusters of indicators (90% of variability of structural variables)
- We chose 9 variables as structural i.e. defining propensity scores (before support in 2007)
- We tested using **probit regression** how these structural variables determine the participation in M121 and M123

	Participation 2008-2010				Participation 2008-2011			
	M121		M121 + M123		M121		M121 + M123	
<i>Structural variables</i>	<i>direction</i>	<i>signif.</i>	<i>direction</i>	<i>signif.</i>	<i>direction</i>	<i>signif.</i>	<i>direction</i>	<i>signif.</i>
Cash-flow (CF)	+	***	+	***	+	***	+	***
CF/Labour costs	-	**	-	***	-	**	-	**
Operation surplus/ Costs	+		+		+		+	
Land productivity (CF/UAA)	+		+	*	+		+	*
Investment/Fixed assets	+		+		+		+	
Bank credit indebtedness	+	***	+	**	+	***	+	***
Total indebtedness	-	***	-	***	-	**	-	**
The share of grasslands	+		+		+		+	
LU of ruminants per ha of UAA	+	***	+	***	+	***	+	***

Results

Structural characteristics in 2007 of participating and non-participating farms in 2011 – whole sample

Structural variables	units	n_1	n_0	mean_1	mean_0	differ	SE	P
Total assets	000 CZK	583	832	128 066	59 271	68 796	5 236	0,000
UAA	ha	583	832	1 717	1 038	680	59	0,000
Share of grassland	%	583	832	0,258	0,246	0,011	0,016	0,478
Cash-flow	000 CZK	583	832	15 177	7 085	8 092	637	0,000
Sales	000 CZK	583	832	71 848	33 528	38 320	3 091	0,000
Labour productivity	CZK/CZK	581	824	0,970	1,935	-0,966	0,319	0,003
Total indebtedness	%	582	832	0,415	0,530	-0,115	0,017	0,000
Credit indebtedness	%	582	832	0,314	0,231	0,083	0,013	0,000
Investment activity	%	583	832	0,179	0,150	0,029	0,024	0,222
LU of ruminants	LU	581	831	660	245	415	26	0,000

Results of CFA – whole sample

Table 2 Comparisons of results according to different matching methods

D-I-D	PSM - kernel						NNM according Abadie et al. (2004)					
	MOD 2010			MOD 2011			MOD 2010			MOD 2011		
Indicator	ATT	SE	Sig.	ATT	SE	Sig.	ATT	SE	Sig.	ATT	SE	Sig.
Gross value added (per farm)	1091	733		1796	870	**	1986	688	***	2195	793	***
Labour productivity	0.045	0.249		0.214	0.127	*	-0.098	0.159		0.108	0.159	
Profit (per farm)	524	619		621	833		789	545		307	1042	
Efficiency	0.221	0.141		0.269	0.162	*	0.188	0.075	**	0.209	0.073	***
Operational efficiency	0.048	0.015	***	0.041	0.014	***	0.043	0.019	**	0.028	0.010	***
Credit indebtedness	0.029	0.005	***	0.040	0.007	***	0.023	0.007	***	0.033	0.007	***

D-I-D: Difference in Difference between treated and non-treated farms and between years 2007 and 2010 or 2011

MOD: treated farms under measure 121 Modernisation of agricultural holdings

Labour productivity = GVA / Labour Costs

Efficiency = GVA / Total Sales

Operational efficiency = (Net Operation Surplus) / (Intermediate Consumption + Labour Costs + Depreciation)

Credit indebtedness = Bank Credits / Total Assets

ATT assessed by the result indicators are (+) and 4 of them are sign. at the 10% level

Positive impact on GVA, efficiency and operational efficiency

Increasing of credit indebtedness in supported farms - support mobilised additional financial resources

Results of CFA – farms with density of ruminants

Table 3 Effects of investment measures by the density of ruminants - nnmatch Abadie et al. (2004)

D-I-D	Ruminants ≥ 0.2 LU/ha			Ruminants < 0.2 LU/ha			Ruminants ≥ 0.2 LU/ha			Ruminants < 0.2 LU/ha		
	MOD+AV 2010			MOD+AV 2010			MOD+AV 2011			MOD+AV 2011		
Indicator	ATT	SE	Sig.	ATT	SE	Sig.	ATT	SE	Sig.	ATT	SE	Sig.
Gross value added (per farm)	1565	588.5	***	2519	1232.3	**	1835	647.9	***	2155	1272.8	*
Labour productivity	-0.140	0.129		0.236	0.174		0.193	0.099	*	0.066	0.311	
Profit (per farm)	630	480.9		579	924.5		1128	536.2	**	-155	1196.9	
Efficiency	0.206	0.089	**	0.019	0.034		0.249	0.107	**	0.025	0.016	
Operational efficiency	0.037	0.010	***	0.044	0.023	*	0.031	0.011	***	0.028	0.017	*
Credit indebtedness	0.034	0.007	***	-0.001	0.012		0.038	0.008	***	0.006	0.014	

MOD+AV: treated farms under measures 121 Modernisation of agricultural holdings and 123 Adding value to agricultural and food products

Positive impact on GVA, labour productivity and efficiency in latter period (2011)
 The effects on cattle intensive farms (dairy production) are largely significant
 in contrast to the other group
 Increasing of credit indebtedness in supported farms

Results of CFA – share of grassland

D-I-D Indicator	Share of Grassland >=20% PRVMOD 2010			Share of Grassland <20% PRVMOD 2010			Share of Grassland >=20% PRVMODPH 2010			Share of Grassland <20% PRVMODPH 2010		
	ATT	P	Sig.	ATT	P	Sig.	ATT	P	Sig.	ATT	P	Sig.
Gross value added	1804	0,035	**	563	0,709		1893	0,029	**	556	0,720	
Labour productivity	-0,105	0,861		0,115	0,099	*	-0,079	0,864		0,110	0,136	
Profit	458	0,573		757	0,550		484	0,490		823	0,514	
Efficiency (Share of GVA in Total revenues)	0,492	0,198		0,013	0,442		0,483	0,149		0,012	0,642	
Operational efficiency	0,085	0,011	**	0,016	0,242		0,086	0,006	***	0,015	0,243	
Credit indebtedness	0,027	0,000	***	0,031	0,000	***	0,026	0,020	**	0,030	0,001	***

Positive impact on GVA operational efficiency and credit indebtedness for farms with higher share of grassland than 20%

Higher effect of labour productivity in case of farms with lower share of grassland

Increasing of credit indebtedness in all supported farms

Invest. objects of measure 121 in 2008-11

Investment object	Completed projects #	Support budget CZK million	%	Applicants			
				Individual	Corporate	in LFA	Young
Livestock	972	2149	72%	32%	68%	69%	20%
Buildings	593	1363	46%	33%	67%	67%	22%
of it dairy cow sheds	122	410	14%	40%	60%	64%	11%
Technique and technology	126	195	7%	27%	73%	63%	14%
Storages for secondary products	105	212	7%	21%	79%	70%	12%
Crop production	392	779	26%	39%	61%	27%	32%
Buildings	266	582	20%	43%	57%	23%	37%
Machinery and equipment	126	197	7%	29%	71%	33%	24%
Other	21	52	2%	38%	62%	62%	10%
Total	1385	2980	100%	34%	66%	57%	24%

Overall effects in longer time period

	GVA increase per farm	Number of supported large farms	Overall effect per year	Overall effect per 10 years
	000 €	no.	000 €	000 €
PSM kernel	71,8	583	10 472	104 717
NNMatch	87,8	583	12 798	127 984

	Overall effect over 2008-11	The sector GVA Σ 2008-11	The share of the effect on the sector GVA
	000 €	000 €	%
PSM kernel	41 887	3 160 150	1,3%
NNMatch	51 193	3 160 150	1,6%

Conclusions

- Selected measures of Modernisation and Adding value under RDP have improved performance of supported farms
- Significant **benefits** of the investment support in terms of **business expansion** (GVA) and **operational efficiency** rather than labour productivity (GVA/labour costs).
- The evident differences are among effects in sub-samples
- The effects **on cattle intensive farms** (dairy production) are higher and largely significant in contrast to the other group
- Benefits higher in farms with **higher share of grassland (>20%)**
- Supported investments expose into **income increasing** of farms that flows from increasing of animal production efficiency, revenues increasing and also **reduction of operational costs** mainly do to material inputs rather than labour costs.
- The effects and their significance depends on the considered period and matching method.

Conclusions - further research

- (on-going research)
- Needed improvements of the analysis
 - Use database with more structural variables to implement better counterparts for supported farms represented also by small scale farming (FADN database with individual and corporate farms)
 - Take in account more time after realisation of investment



Thank you for attention

medonos.tomas@uzei.cz



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Development of labour productivity and investment-labour ratio

