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Paper prepared for the joint 131st EAAE
and 21th Agrarian Perspective Seminar
"INNOVATION FOR AGRICULTURAL COMPETITIVENESS AND SUSTAINABILITY OF RURAL AREAS"

Prague, September 18-19, 2012

The assessment of the effects of investment support measures of the Rural Development Programmes: the case of the Czech Republic

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Abstract

The investment support has been considered as a principal vehicle for enhancing competitiveness of the Czech agriculture since the early days of the economic transition. However so far, little attention has been paid to the evaluation of actual effects of the corresponding support programmes. The objective of this paper is to assess economic and other effects of the measure 121 "Modernisation of Agricultural Holdings" of the RDP 2007-2013 on the Czech farms. The counterfactual approach is adopted investigating what would have happened if the supported producers did not participate in the programme and then comparing the result indicators. The quantitative analysis of programme effects is complemented by a qualitative survey on 20 farms which received the investment support between 2008 and 2010. The quantitative assessment showed significant benefits of the investment support in terms of business expansion (GVA) and productivity (GVA/labour costs) improvements. These results were confirmed by the qualitative survey. It showed that production expansion and productivity increase were primary objectives of the investment strategies on most of the farms. The public support enabled farms to achieve these strategic objectives. The respondents of the survey declared that the supported investment was important for their prosperity however, we could not prove it in the quantitative assessment in terms of profit and cost/revenue ratio. Finally, the issue of deadweight of the investment support is discussed: the figures on very low net investment relatively to the provided public support at the sector level and answers of respondents indicate possible significant deadweight, however, the insight is incomplete, since it does not take into account post accession restructuring of the sector and multiannual and multi-enterprise character of investment at the farm level.

Keywords: Investment support, counterfactual analysis, propensity score matching, direct and indirect effects

JEL Classification: Q10, Q18

1. INTRODUCTION

The objective of the paper is to assess economic and other effects of the measure 121 "Modernisation of Agricultural Holdings" of the Rural Development Programme (RDP) 2007-2013 and the similar one of the Operational Program - Agriculture (OP), 2004-2006 on the Czech farms.

The investment support has been considered as a principal vehicle for enhancing competitiveness of the Czech agriculture since the early days of the economic transition. However so far, little attention has been paid to the evaluation of actual effects of the corresponding support programmes. In the 1990s, the success of the interest subsidies for investment credits was justified practically only by the high participation rate and the "improved" level of the sector gross fixed capital formation (Trzeciak-Duval 2003, Janda 2006, Čechura 2008). The need for a more rigorous assessment arrived with EU development programmes: SAPARD, OP Agriculture and RDP 2007-2013. The considered quantitative indicators for the programme assessment are stated in the Common Evaluation a Monitoring Framework (CMEF, EC 2006). They are structured according to the Intervention Logic concept in input, output, result and impact indicators.

There are two serious problems of CMEF and the EU evaluation guidelines which eventually might lead to wrong conclusions on the success of the programme: i) it is impossible to associate the result

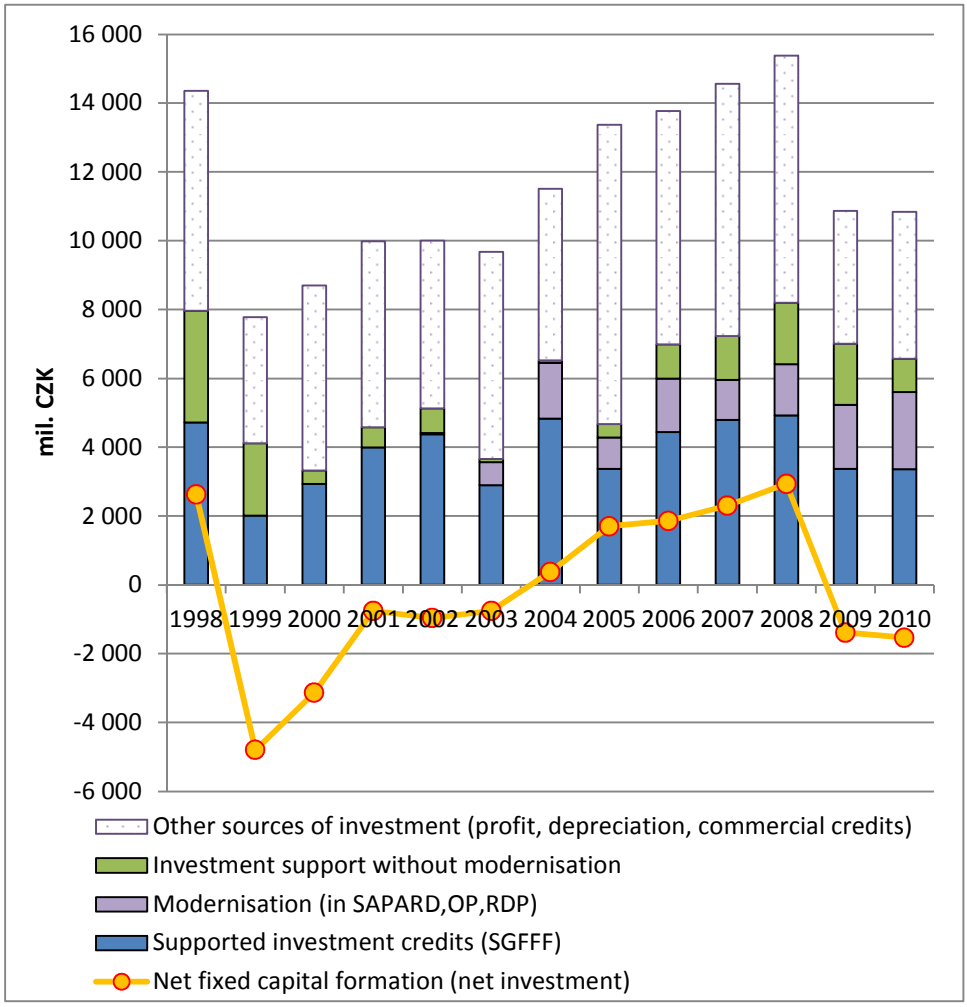
and impact indicators (as GVA/GDP) only with policy intervention, since there are number of other factors and circumstances affecting the results; ii) usually, policy measures either target or are exploited by only some groups of producers/regions, etc., which makes simple comparisons between supported and non-supported groups methodologically problematic (Michalek, 2007). To deal with these shortcomings we adopted the counterfactual approach investigating what would have happened if the supported producers did not participate in the programme and then comparing the result indicators (Khandaker et al. 2010). Since it is principally impossible to observe on the same farm the effects of participation and non-participation in the measure, one has to choose or to construct a control farm with identical characteristics from the pool of non-participating producers. To do this we follow propensity score matching approach (PSM, Caliendo and Kopeinig, 2005).

The paper is structured in six paragraphs: In the next paragraph we will review the investment support policy of the Czech Republic. Paragraph 3 is devoted to the adopted methodology and in Paragraph 4 we are presenting the quantitative assessment results. To get better notion of the actual investment projects and to learn about their effects on farmers and about problems with their implementation we conducted 20 case studies; these are described in paragraph 5. Afterwards, both results are compared and conclusions are drawn (paragraph 6).

2. INVESTMENT SUPPORT

From the beginning of agricultural transition it was clear that there were not sufficient funds on farms to assure a prompt recovery of the sector. In the early 1990s, the Czech government provided generous investment grants mainly to the emerging family farms. Later, the policy concentrated on improving access of farms to credits by providing interest subsidies and guarantees. The latter referred to a problem of lack of collateral; most of the assets was of doubtful value if the sector declined, while land was owned by external restituents or by the state (Janda and Ratinger 1997). The interest rate subsidy was a principal investment support measure until the EU accession, but even after that it has continued until now.

Figure 1 Investment activity in agriculture 1998-2010



Source: CzSO (EAA), PGRLF, SZIF

Gross fixed capital formation (GFCF) is a basic indicator of the investment activity in the Economic Accounts for Agriculture. GFCF of the agricultural sector varied substantially in absolute and relative[1] terms over last decade (Figure 1). It can also be seen from Figure 1 that agricultural GFCF is correlated with the credit support of the Support and Guarantee Fund for Farms and Forestry (SGFFF) at least until the EU accession. It is also worth to note that the amplitudes of agricultural GFCF are larger than those of the SGFFF support. It can have two explanations: first, the public support (SGFFF) encouraged also private investment activity; and second, the investment activity also reflects the sector and overall economic situation: post-privatisation stabilisation in in the late 1990s, accession expectations[2] in 2001-2003 and the recent financial crisis of 2008-2009.

The new impulses for investment activity have gradually come with the EU accession: new market opportunities resulting from joining the common market, financial stabilisation of farms given by increasing direct payments and finally the investment grants provided by the rural development programme.

[1] In respect to the total GFCF.

[2] Including the need to comply with "acquis", production expansion for creating a solid reference base, etc. One should also note that these years farmers got generous compensations for bad harvests caused by disastrous weather.

According to Bašek et al. (2010) integration in the common market can be seen as a driving factor of markedly increasing specialisation of farms: Growing specialisation in filed crops can be observed in good soil and climatic conditions. Growing concentration of dairy cow herds can also be noticed - not necessarily in specialised dairy farm, it usually mixed production system, however the dairy units are big and usually one of the main enterprises on the farm. Pig production has left common farms and nowadays it is concentrated in big specialised pig production companies; overall pork meet production declined continuously and dramatically over the last decade. In contrast beef cattle emerged on mountain and sub-mountain grasslands, however, these are truly product of the policy; market opportunities just determine the intensity. This specialisation trend has been also reflected in the investment activity.

Direct payments have stabilised farm income. In a consequence, it enabled corporate farms to pay off their restitution liabilities. They improved financial credibility of family and corporate farms vis-à-vis banks and input suppliers. Thus, they are likely behind the increasing investment activity between 2004 and 2008 (see Figure 1). We can see that during this period, farms invested above the reproduction (net investment – yellow line in Figure 1) while in most other years capital stocks declined.

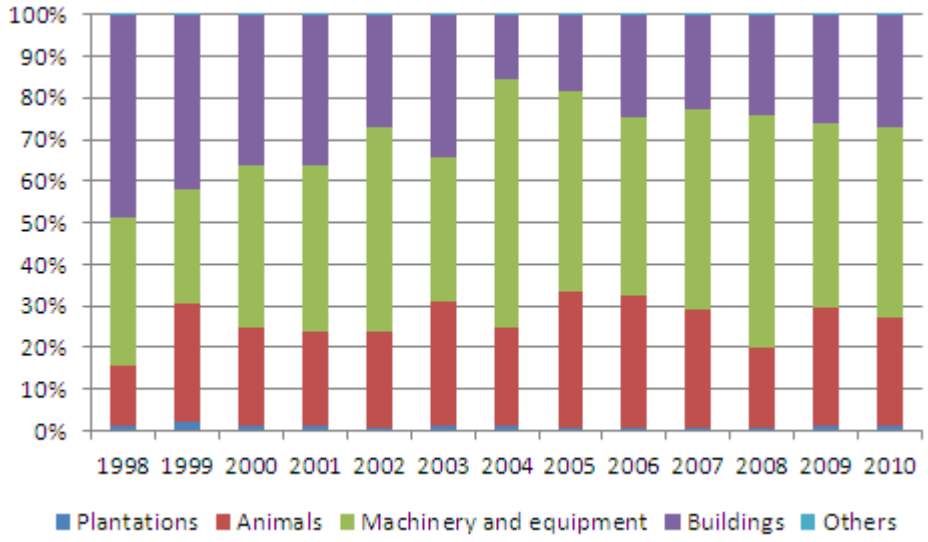
Investment grants returned in the policy with SAPARD[3], but funds were rather limited. Since the EU accession they have become the main form of the investment support; in 2004-2006 the investment support was included in the Operational Programme for Agriculture, in the current period, it is the main tool of the Axis 1 of the Rural Development Programme (measures 121, 123, 124). While the measure 121 (Modernisation of agricultural holdings) has attracted farmers to the extent that its budget was increased already twice; the other two measures (123 - Adding value to agricultural and forestry products and 124 Cooperation for development of new products, processes and technologies in the agriculture and food sector and the forestry sector) have been considered as too demanding, their potential has been somehow hidden for farmers.

Returning to Figure 1 it is evident that the investment support might stimulate investment over the reproduction of capital only in 1998, and in the period shortly after accession (2004-2008). Given the fact that in best years, net investment might constitute only about a third of supported investments (thus the rate of public co-financing) we can conclude there was no or only very little additionality achieved by the policy. In the 1990, the policy declared as its objective to assure reproduction of agricultural capital, however, since the EU accession additionality has deemed to be achieved.

Most of the investment (more than 40%) goes to machinery and equipment (post-harvest processing, milking cooling equipment etc.). Investment in buildings dropped from almost 50% in 1998 to less than 30% in the recent years. Farmers' investment in breeding animals account for 20 to 30 per cent (Figure 2). The emphasis on machinery and equipment in the investment structure might indicate that farmers are more concerned of labour productivity than of the other possible effects of modernisation through investment. Nevertheless, it would be hard to assert that the other two main directions of investment activity are undervalued; rather we can stress that the sector might have become saturated in terms of agricultural buildings (storages, sheds) and that breeding animals are regularly replaced.

[3] Special Accession Programme for Rural Development

Figure 2 Investment structure

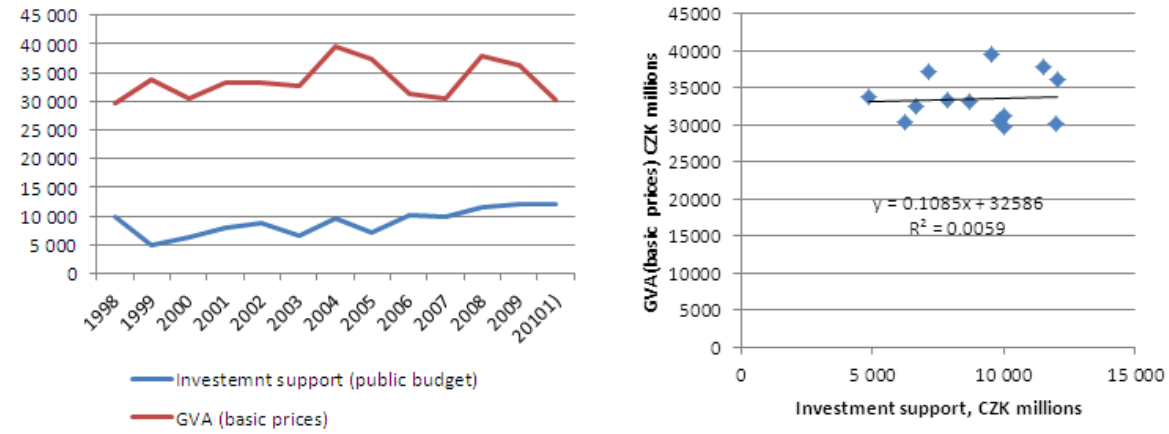


Source: CzSO (EAA)

In spite of the contraction of the Czech livestock production, most of the modernisation support went in the livestock sectors, particularly in the dairy enterprises (2008-2010) – see Table 2. It is because there were essential needs (welfare, manure storage and treatment) and because there are significant immediate and tangible benefits from modernisation (higher yields, higher quality, reduction of (hired) labour, improved health of animals – thus lower variable costs).

Linking the investment support (of all kind) to the performance of the agricultural sectors will provide a preliminary notion about the effect of the support. Such a brief analysis is illustrated in Figure 3.

Figure 3 Investment support and sectoral GVA



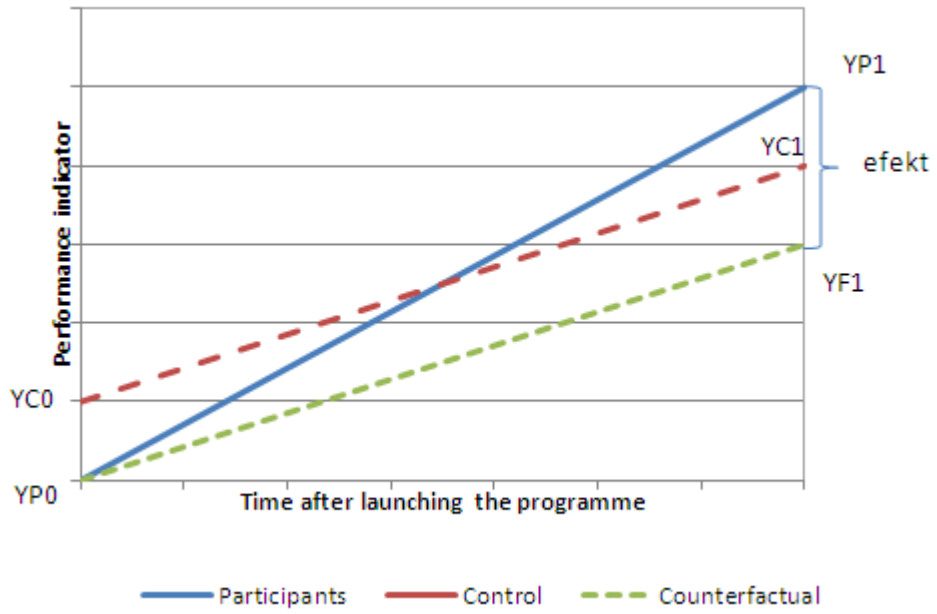
Source: CzSO (EAA)

From the first look (on the left chart), there is no evident effect of the support programme on the sectoral GVA. The simple statistical analysis (linear regression in the right chart) indicates that there might be about 10% of the investment support projected immediately in the agricultural GVA. However, the model is not statistically significant. Also, one should consider a delay of an investment effect. A simple shift of the effect of two or three years, however; does not lead to a significant relationship. It is evident that the sector approach is insufficient for the investment programme assessment.

3. METHODOLOGY

The above figures on the support programmes and the sectoral GVA indicate the difficulties (the ambiguity) of the judgement of the policy effectiveness and efficiency. There is therefore a need for methods and approaches which enable the evaluator to assess precisely the mechanisms by which beneficiaries are responding to the intervention. These mechanisms can include links through markets or improved social networks as well as tie-ins with other existing policies (Khandker, et al. 2010). To prove that changes in targets are due only to the specific policies undertaken the counterfactual approach is needed. It is illustrated in Figure 4. The performance of farms participating in an investment support programme (treated) improved from YP0 to YP1. The simple "before and after" comparison (YP1 – YP0) can hardly be accounted only to the programme, if there are changes in the performance independent of the programme as it is witnessed by the performance of non-participating (control) farms which also changed from YC0 to YC1 over the same period. However, neither the difference YP1-YC1 necessary represents a correct judgement of the effect of the programme, because it is likely that participating and non-participating groups differ in their structures and pre-programme situations (Khandeker, et al. 2010). The real effect can only be obtained if we know the counterfactual outcome YF1 i.e. what would happen if there was no programme. However, this is principally impossible, hence one has to find an estimate.

Figure 4 The idea of the counterfactual



Source: Khandker et al. (2010)

The standard framework in evaluation analysis to formalise the above problem provides Roy-Rubin-model (Caliendo, Kopeinig, 2005). Let D_i denotes a treatment indicator which equals one if individual i receives treatment and zero otherwise. The potential outcomes are then defined as $Y_i(D_i)$ for each individual i, where i = 1…N and N denotes the total population. The average treatment on treated (ATT) effect is defined as follows

$$\tau_{ATT} = E[\tau|D=1] = E[Y(1)|D=1] - E[Y(0)|D=1] \qquad (1)$$

The second term on the right hand side of Equation (1) is the counterfactual, however, unobservable. Instead we have to use E[Y(0)|D=0]. The effect τ_{ATT} is truly identified if and only if

$$0 = E[Y(0)|D = 1] - E[Y(0)|D = 0]; \qquad (2)$$

The right hand term of Equation (2) is called self-selection bias. In non/experimental data, the condition of zero self-selection bias is usually not achievable, statistical methods have to be used to estimate the average treatment effect on treated (τ_{ATT}). In this paper we adopted propensity score matching (PSM).

Assume that there is a set of observable variables X which are not affected by treatment and that potential outcomes are independent of treatment assignment, i.e.

$$Y(0), Y(1) \perp D|X, \forall X; \qquad (3)$$

This condition is known a "unconfoundedness" or conditional independence assumption. Let us defime the propensity score P(D = 1|X) = P(X), i.e. the probability for an individual to participate in a treatment given his observed variables X. The unconfoundedness condition can be rewritten as

$$Y(0), Y(1) \perp D|P(X), \forall X; \qquad (4)$$

As it was showed by Rosenbaum and Rubin (1983). A further requirement besides independence is the common support or overlap condition:

$$0 < P(D_i = 1|X_i) < 1, \text{ for some } i; \qquad (5)$$

which ensures that there are persons with which have positive probabilities to participate as well as to stay outside. The PSM estimator of the treatment effect on treated is then defined as

$$\tau_{ATT}^{PSM} = E_{P(X)|D=1}\{E(Y(1)|D = 1, P(X)) - E(Y(0)|D = 0, P(X))\}; \qquad (6)$$

We can understand the PSM estimator of τ_{ATT} as a mean difference in outcomes over the common support, appropriately weighted by the propensity score distribution of participants (Caliendo, Kopeinig, 2005). From the number of methods available for construing the PSM estimator we have chosen nearest neighbor (NN) matching and kernel matching.(KM) Nearest neighbor matching. Is the most straightforward approach; the individual from the comparison group is chosen as a matching partner for a treated individual that is closest in terms of propensity score. One of the disadvantages of NN matching is that only a few observations from the comparison group are used to construct the counterfactual outcome of a treated individual. Kernel matching (KM) is a non-parametric matching estimator that uses weighted averages of all individuals in the control group to construct the counterfactual outcome. Following Smith and Todd (2005), ATT effect estimator (6) can be rewritten

$$\tau_{ATT}^{PSM} = \frac{1}{N_T}\left[\sum_{Di=1} Y_i(1) - \sum_{Dj=0} w(i,j) Y_j(0)\right] \quad (7)$$

where N_T denotes the number of treated (participating in the programme). In the case of KM the weights w(i.j) are defined as follows

$$w(i,j) = \frac{K\left(\frac{P(X_j) - P(X_i)}{a}\right)}{\sum_{D_k=0} K\left(\frac{P(X_k) - P(X_i)}{a}\right)}; \qquad (8)$$

Where *K* is a kernel function and *a* is a bandwidth parameter. Note that kernel matching is analogous to regression on a constant term (Khandker et al. (2010)). The main advantage of this approach is the lower variance due to more information used. A drawback of it is that possibly observations are used that are bad matches. Therefore, good overlap is of major importance for KM.

The quantitative analysis of effects is completed by 20 case studies. The qualitative survey (interviews with the farm manager) concentrated not only on the manager's subjective assessment of economic benefits from the investment support but also on the non-economic effects as improved animal welfare or working conditions, the farm business development strategy and how the supported investment fits

in it, motivations and information gathering for the given investment project, the use of advisory services and the cooperation with research.

We used several sources of data on farm characteristics and performance - CreditInfo database, LPIS, data on agricultural supports published by SZIF[4]. CreditInfo is main source, it is a database built on annual reports of companies (large legal entities) which are oblige by the Commercial Code to publish their economic and book keeping figures. CreditInfo includes only large farms and only financial indicators. From LPIS we linked information on utilised agricultural area and on land use.

All calculations are done in STATA 11.

To get a deeper insight in the process and effects of investment support we selected 20 representative projects in respect to investment size, legal form of investor farm, type and direction of supported investment. On this small sample we conducted qualitative research aimed at business and investment strategies, the importance of the support for implementing the strategy, business environment and effects of the investment for modernisation. For this purpose we elaborated a questionnaire which included 28 questions structured in 7 blocks (Table 1). The respondents were asked to state their qualitative judgement on the investigated issue either on the 3 or 5 point scale[5] or by ordering pre-defined judgments or reasoning.

Table 1 Structure of the questionnaire for a qualitative survey.

Block	Questions	Content
I	A	Characteristics of the project holder
II	B-G	Current and past investment strategy
III	H-L, P	Project description including motivations
IV	M-N	Preparation of the project and of the application for a support
V	O, Q-Z	The assessment of project benefits, of fulfilments of expectations, ...
VI	AA	Future investment strategy
VII	BB-CC	Business environment for investment

Beside filling the questionnaire the interview included free discussion on the implementation process, and lessons learned, and the excursion to the investigated investment. While the questionnaire was usually filled by the top manager, during the excursion we met also other management staff and workers associated with the given investment.

4. RESULTS OF THE QUANTITATIVE ASSESSMENT

The analysis concentrated on measure 121 of the current Rural Development Programme[6]. The modernisation targets (investment directions) are summarised in Table 2 below. Most of the support was directed in the livestock sector in terms of numbers (57%) as well as in terms of funds (72%). This bias against the livestock sector results from needs of applicants (see section 2) as well as from policy preferences – projects for modernization of the livestock production got additional points in the evaluation score. The structure of applicants follows the structure of farming and its geographical distribution; livestock production is concentrated more in less favoured areas and in a similar

[4] State Intervention Fund for Agriculture, the paying agency.
[5] 1-poor, 3 or 5 – excellent.
[6] i. e. RDP for period 2007-2013.

proportion are the applicants. Surprisingly, there is higher share of young farmer applicants for crop production projects than in the case of livestock production.

Table 2 Investment objects of measure 121 "Modernisation of agricultural holdings" 2008-2010

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

Source: SZIF

In the CreditInfo database we identified 844 agricultural businesses which were included there with all economic figures for all four years of the period 2007-2010. About a third of them (291) were awarded an investment grant of the Czech RDP (measure 121) within this period; actually between 2008 and 2010, because no project was completed in 2007[7]. We lack the details about the investment directions of 291 supported farms included in the database CreditInfo, however it is very likely that their supported modernisation follows the same pattern as the population of farms participating in Measure 121 (Table 2).

There are significant differences between participating and non-participating farms in the CreditInfo sample: the average utilised agricultural area of participating farms is substantially greater (1826 ha) than the one of non-participants (1084 ha)[8]. I terms of assets[9] the difference is even deeper: the average value of assets is more than twice higher in the sample of participants than in the sample of nonparticipants, and the figures per hectare are CZK 83,882 and CZK 58,518 on participating and non-participating farms respectively. It indicates that participating farms are on average not only substantially larger but also much more capital and labour intensive than non-participating ones (see Table 3 for details). On the other hand, we can show that variation in both sub-samples is quite high and among non-participants significantly higher (for example the coefficient of UAA variation[10] is 0.71 for participants and 0.82 for non-participants). In fact high variation is positive for matching, since we likely find similar farms in the both sub-samples.

[7] We consider only completed projects
[8] The both figures for 2010
[9] Of the balance sheet
[10] Coefficient of variation = standard error/mean

Table 3 Characteristics of participating and non-participating farms in the CreditInfo sample

		2007		2010		Index 2010/2007	
Indicator	**Unit**	**Participating**	**Non-particip.**	**Participating**	**Non-particip.**	**Participating**	**Non-particip.**
Total assets	CZK '000/farm	146 633	63 082	153 188	63 405	104.5	100.5
UAA	ha/farm	1 831	1 100	1 826	1 084	99.8	98.5
The share of grasslands	%	21.2	23.7	21.8	24.2	102.8	102.0
Total assets/UAA	CZK '000/ha	80.1	57.4	83.9	58.5	104.7	102.0
Gross cash flow	CZK '000/farm	16 419	7 631	13 851	5 757	84.4	75.4
Cash Flow/UAA*	CZK '000/ha	9.0	6.9	7.6	5.3	84.6	76.6
Labour cost/UAA*	CZK '000/ha	12.0	8.9	11.2	8.5	93.9	95.5
Bank credits/total assets*	%	13.0	11.7	16.2	12.2	123.9	103.9

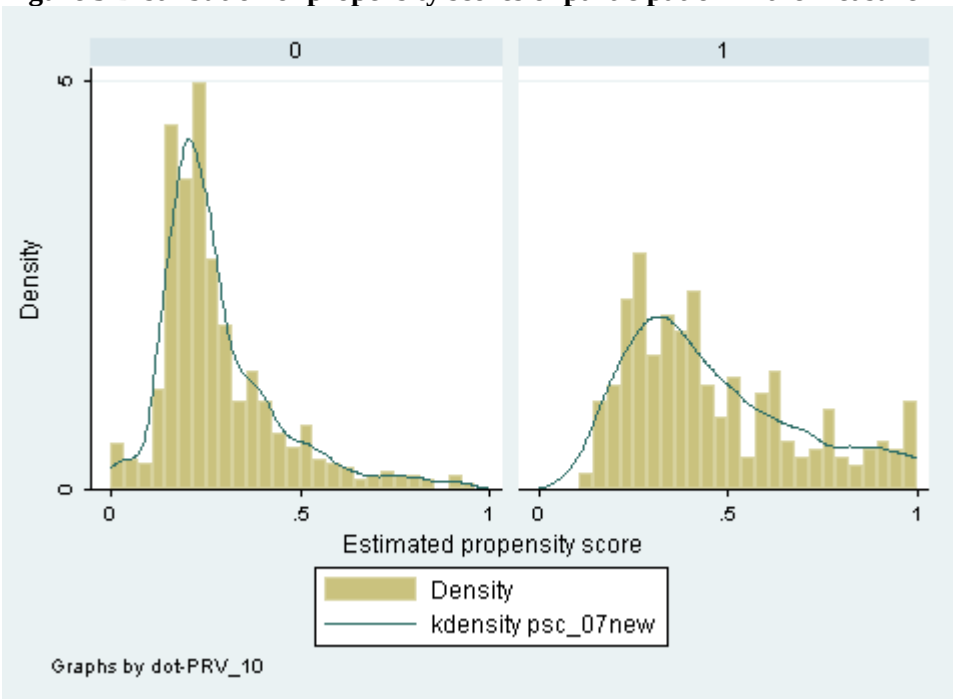
*weihgted average

UAA - Utilised Agricultural Area

Source: CreditInfo (2011), LPIS (2011), SZIF(2011)

For calculating propensity scores we applied probit regressions (Gujarati, 1988) on a set of structural variables (UAA, revenue, the share of grasslands, cash flow, depreciation and credits to total assets ratio). These structural variables are commonly considered as factors affecting investment and thus they are deemed as possible determinants of farm participation in the modernisation programme. The first two variables represent size of the business; the share of grasslands indicates if a farm is in the less favoured area (LFA); and the rest are variables referring to financial sources for investment. The probit regression showed that size variables are poor insignificant determinants of participation (Table 6 in Appendix). Note however, that multicoliearity of structural variables might be behind that. The distribution of estimated propensity scores is illustrated in Figure 5; a good overlap is evident.

Figure 5 Distribution of propensity scores of participation in the measure 121 of the Czech RDP



Source: own calculations using STATA procedure pscore (probit regression)

In the research we tested two matching algorithms: nearest neighbour matching (in Stata attnd) and kernel matching (attk and psmatch2). In this paper we are presenting kernel matching with the standard Gaussian kernel ($K(u) = \exp(-u^2 / 2)$) and with the standard and Mahalanobis metric (Rubin, 1980, Stata – psmatch2), i.e. in equation (8) $P_j - P_i$ is replaced by the metric $d(i,j)= (P_j - P_i)\, S^{-1}(P_j - P_i)$, where P refers to the 2x1 vector of propensity scores and S is the pooled within-sample (2×2)

covariance matrix of P based on the sub-samples of the participating and non-participating farms. Standard errors of the average treatment effects are calculated using bootstrapping.

We have chosen 6 performance variables (Table 4) on which we measure results of the investment support programme. Four of these variables relate to value added and productivity in both terms: their state and dynamics. In addition we look at profit and cost revenue ratio.

Table 4 List of performance (result) variables

Acronym	Description	Applied by
GVA_	Gross Value Added	Božik et al. (2011)
GVA/LC	Productivity measured by the ratio of GVA over labour costs	
dGVA_	Change of GVA over 2007-2010	
d (GVA/LC)	Change of producivity over 2007-2010	
Profit	Profit	Michalek (2009)
Cost/rev	Cost Revenue ratio	

The assessment of the effect of measure 121 “Modernisation of agricultural holdings” based on kernel matching is summarised in Table 5. Both metric approaches provide very similar results; the main difference is in the significance levels. The average treatment effect differs substantially only in the case of productivity change.

Table 5 Results of matching (attk and psmatch2 in Stata).

	Total	Treated	Controls
Farms	837	290	547

attk (standard metric)

Variable	Sample	Treated	Controls	Difference	S.E.	T-stat	P	sig.
GVA_10	Unmatched	21051	7173	13877				
Gross Value Added	ATT	21051	15035	6016	1275	4.717	0.000	***
GVA/LC_10	Unmatched	0.859	0.952	-0.093				
Productivity	ATT	0.859	0.636	0.223	0.066	3.403	0.001	***
dGVA_07_10	Unmatched	-5624	-3792	-1832				
Change of GVA	ATT	-5624	-7080	1457	773	1.884	0.068	*
d (GVA/LC)_07_10	Unmatched	-0.211	0.474	-0.685				
Change o productivity	ATT	-0.211	-0.273	0.062	0.086	0.714	0.309	
Profit_10	Unmatched	3060	1425	1635				
	ATT	3060	2126	934	1439	0.649	0.323	
Cost/Revenue_10	Unmatched	0.953	0.975	-0.023				
	ATT	0.953	0.984	-0.031	0.015	-2.072	0.047	*

psmatch2 (Mahalanobis metric), 837 observations

Variable	Sample	Treated	Controls	Differ.	S.E.	T-stat	P	sig.
GVA_10	Unmatched	21051	7173	13877	1218	11.39	*2E-24*	
Gross Value Added	ATT	21051	14491	6560	1788	3.670	0.001	***
GVA/LC_10	Unmatched	0.859	0.952	-0.093	0.787	-0.120	*0.396*	
Productivity	ATT	0.859	0.644	0.215	0.114	1.880	0.068	*
dGVA_10_07	Unmatched	-5624	-3792	-1832	634	-2.890	*0.006*	
Change of GVA	ATT	-5624	-7063	1439	948	1.520	0.126	
d (GVA/LC)_10_07	Unmatched	-0.211	0.474	-0.685	1.318	-0.520	*0.348*	
Change o productivity	ATT	-0.211	-0.443	0.232	0.096	2.410	0.022	**
Profit_10	Unmatched	3060	1425	1635	889	1.84	*0.0736*	
0	ATT	3060	1941	1119	1258	0.890	0.268	
Cost/Revenue_10	Unmatched	0.953	0.975	-0.023	0.019	-1.170	*0.201*	
0	ATT	0.953	0.965	-0.012	0.011	-1.100	0.217	

Treated = participating in mesure 121 of RDP
Controls= non-participating

Source: own calculation (Stata 11)

With exception of profit, all variables exhibit a significant effect of the investment support to modernisation in one or the other matching model; creation of GVA and labour productivity are significant in both models. In the case of profit, it is extremely high variation of this variable that the huge difference of averages between participants and constructed controls (CZK 1.1 million) is not statistically significant.

5. CASE STUDIES

The sample includes 7 individual and 13 corporate farms. All surveyed farms got support from the present Rural development plan (2007-2013) – measures 121 and 123; 7 investment projects were oriented on crop production, 10 projects on animal production and 3 projects on food processing products on farms. The average size of total investment expenditures of studied projects reached 15.7 mil. CZK with the average amount of the support 4.2 mil. CZK i.e. the rate of the support was on

average 39%. All projects were already realised at least a year before the interview and mostly run under full operation.

In terms of farm strategies and objectives of investment, 75% of projects[11] were qualified by respondents as development (grow through) investments i.e. investments for the purpose of increasing farm ability to produce and to sell products or services; 25% of projects indicated rather replacement investment even if with higher operational efficiency; 15% of all projects were bounded with needs to comply with the legislative (environmental) requirements on production and 30% were realised in animal production in order improve animal welfare above current standards.

The investments in last 5 years which were realised in the context of farm development strategies aimed at growth (in 60% of cases), improving the quality (55%); 10% of respondents purely and further 15% of respondents additionally invested to advance specialisation of a farm.

These strategies obviously result not only from market opportunities and opportunities to provide public services, but also from internal conditions. Market opportunities were referred as the most significant factor by a half of respondents and the average score in this case was 4.5 on the 5 point scale. On the other hand, factors indicating surplus or absence of capacity were assigned as less important (only 1/5 of the respondents indicated lack of land for usage (average score 2.0) or shortage of qualified employees (average score 1.0) as the most important factors,.

The most information on possible innovations is acquired by supported investors from farmers' organisations and from internet sources. Both these knowledge sources are considered in the present conception of the knowledge transfer (KT) in agriculture as two basic levels[12]. Specialised advisory services (the most upper level of KT system) indeed were not included among the predefined answers, but it was not mentioned as other source of information in any case study. Also, from the other questions and informal interviews it was clear that use of publicly supported farm advisory is restricted only to a preparation of the investment support application and that the cooperation with research institutions is very low - almost absenting. This is in conformity with findings from other sources that the knowledge transfer from research to farm practices is weak. The actual decision on investment is made on the advice of input suppliers and often on the experience of other farmers who have already invested in the new technology[13].

From the perspective of motivation to participate in the programme, the measure oriented on farm modernisation and on increasing value added is seen first of all as opportunity to get a support for realisation of own innovation plans by 80% of respondents (45% respondents only with this type of motivation). For approximately one third of the investigated supported farms, their participation in the programme was also an exclusive opportunity to get additional financial means for investment. For another 1/3 of the respondents one of the motivation to participate was a need to meet legislative requirements on farm operations.

The importance of the investment support is possible to evaluate also with an assessment of implications in the cases when the support would not be received by a farm so called "deadweight effect" of investment support. The results of interviews show that in 35% of cases the investment project would not be realised without the support any more. Thirty per cent of respondents would make the investment in a reduced size, on average by 42% (the range 30-60%) of the financial

[11] There was possibility to label more possibilities therefore sum gives more than 100%.

[12] So called "introductory advice" provided by farmers' organisations was co/financed from public funds between 2005 and 2009, the reason for stopping co/financing were budget cuts of the Czech government.

[13] Thus it depends on farmer's network.

framework of the actually realised supported investment. On the other hand, 35% of projects would be fully launched also without the investment support. But 2/3 of respondents in this group would realise investment in time-delay or at the expense of other investments in the farm that would not be realised under these circumstances. The average economic size of farms in the second group that would realise investment without support but in reduced size, is the highest (155 thousands CZK of total assets), received more endorsed projects by ten per cent compared to others two and the average size of investment costs per project is about 20 million CZK. Farms that would not realised project at all are in average by quarter smaller (measured by total asset value) compared to second group and the average size of project is 16 million CZK. The third group farms that would realise project even without support has economic size in between two mentioned groups, but the average size of authorised projects is the smallest – 12 million CZK. For these farms the supported investment projects have higher importance so that they would realise them also without support at the expense of other investments. It is possible to conclude that the deadweight effect of the RDP is not so high because only 12% of respondents would realise investment project without any restrictions and moreover the average size of realised projects of these farms was only halfway.

When we try to evaluate effects of the investment support it is necessary to know how important the supported investment was for the farm. For 47% of respondents this supported investment stand for a strategic project influencing in the prosperity of the farm. This importance is underlined also by the fact that the realised investment caused an increase of farm revenue (production) on average by 90% and the share of revenues from this supported activity makes on average more than third share. These projects are oriented especially on animal production and storage capacities. Middle-important and less important projects accounted for 42% resp. 11% of surveyed farms. These are projects with primarily noneconomic objectives, e.g. improving animal welfare, or smaller investment projects of all kind. They do not induce a dramatic production increase (with exception of one project).

Average pay-off period of supported projects is estimated at seven years, but the variability is considerable from 4 to 15 years. Mostly the supported projects contributed to improvement of total farm revenues in average by 18% and/or total cost reduction in average by 12%. The most often and the most significant cost reduction was write down in the case of labour costs followed by cost for repairs and maintenance, cost for energy, medicaments and feedstuffs. More than half of respondents agree herein that supported projects help them to increase in principal stability of their income and for other quarter of farms this benefit is less important. From the noneconomic effects were often mentioned first of all quality improvement and production security followed by improvement of animal welfare and animal production efficiency.

6. CONCLUSISONS: A COMPARISON OF QUANTITATIVE ASSESSMENT RESULTS WITH CASE STUDIES

The quantitative assessment showed significant benefits of the investment support in terms of business expansion (GVA) and productivity (GVA/labour costs) improvements. These results were confirmed by the qualitative survey. The qualitative survey showed that production expansion and productivity increase were primary objectives of the investment (and investment strategies) on most of the farms. The public support enabled farms to achieve these strategic objectives.

The respondents of the survey of 20 supported farms declared that the supported investment was important for their prosperity, however, we could not prove it in the quantitative assessment in terms

of profit and cost/revenue ratio; ATT are in favour of participating (treated farms), but the variances are too high that there is no statistical significance of them.

We learned that most of the investigated farms have their business development strategy and that the investment support enabled the farmers to accomplish it more timely and in greater extent than it would be without it. It can be learn from Table 3 that the ratio of bank credits to total assets increased dramatically on participating farms over the investigated period while on non-participating farms it stayed almost the same in 2010 as in 2007. It indicates that the policy (measure 121 of RDP) encouraged farms to take credits as well as that there are some credit constrains for farms which might prevent them to participate in the investment support programme.

From the case studies results, that supported investment expose into income increasing of farms. This improvement flows from increasing of animal production efficiency, in general from revenue increasing and also relatively important reduction of operational costs and especially labour costs. Moreover respondents indicated range of other qualitative non-economic benefits such as quality and security improving of products, decreasing losses and animal welfare improving.

Finally, the issue of deadweight of the investment support is discussed: the figures on very low net investment relatively to the provided public support at the sector level indicate possible significant deadweight, however, the insight is incomplete, since it does not take into account post accession restructuring of the sector and multiannual and multi-enterprise character of investment at the farm level. According to answers of respondents from the case studies follows that the deadweight effect of the RDP does not seem to be so high because only twelve per cent of respondents would realise investment project without any restrictions and moreover the average size of realised projects of these farms was only halfway.

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Appendix:

Table 6 Results of probit regression

dotprv_10	Coef.	Std. Err.	z	P>z	[95% Conf.	Interval]
UAA_07	-8.7E-05	8.38E-05	-1.04	0.298	-0.00025	0.000077
Grasslands_07	0.36373	0.195535	1.86	0.063	-0.01951	0.746971
cash_flow_07	2.23E-05	1.14E-05	1.95	0.051	-8.76E-08	4.47E-05
revenue_07	2.18E-06	2.63E-06	0.83	0.407	-2.97E-06	7.34E-06
depreciation_07	7.06E-05	2.21E-05	3.19	0.001	2.72E-05	0.000114
cf/LC_07	-0.10456	0.047989	-2.18	0.029	-0.19862	-0.0105
credits/TA_07	0.203832	0.481414	0.42	0.672	-0.73972	1.147386
_cons	-1.04485	0.128012	-8.16	0	-1.29575	-0.79395

Source: own calculation (STATA)