

FIRST RESULTS OF THE COUNTERFACTUAL IMPACT EVALUATION OF ESF ASSISTANCE IN THE CZECH REPUBLIC

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Abstract

Introduction: The programming period of the EU Cohesion Policy went to its second half. It is possible to conduct Counterfactual Impact Evaluation on assistance with large number of observations.

Research question: The main research question is whether there is an impact of assistance of the European Social Fund on sales in supported firms.

Methodology: There have been used two main sources of data –Czech Statistical Office (CZSO) and Monitoring System Monit7+. It enabled us to do a research with application of instrumental variables, regression discontinuity design and conditional difference-in-difference (with propensity score matching). Those methods have been applied on both projects under the grant calls and under the system project „Educate Yourselves“ (“Vzdělávejte se!”). The data enabled comparison between years 2008 and 2009.

Conclusions: The application of regression discontinuity design on the dataset from the CZSO shows that there was identified significant impact on sales 9 to 13 percentage points in the case of successful grant applicants. There has been found also higher impact on sales by regression discontinuity design in the call nr. 39 in comparison with calls nr. 35 and 60.

There has not been proved significant impact of the assistance by the difference-in-difference method.

Key words: Counterfactual, Impact Evaluation, Structural Funds, Human Resources

JEL Code: C31, D61, H71

Introduction

Operational Programme Human Resources and Employment (OP HRE), support area 1.1 is focused on investments in human capital in enterprises. It also helps to develop systems that

help to increase the flexibility of the workforce, increase its knowledge and skills. The aim of this intervention is "To increase the adaptability of employees and employers".

This pilot study of the counterfactual impact evaluation of the OP HRE, support area 1.1 is focused on the statistical verification of the impact of ESF on the business sphere. The aim of this paper is to answer not only what is the impact on turnover, profit and employment in companies, but also explain the mechanism by which this effect occurs. These results may help to target the support from ESF in programming period after 2014.

Results of other studies are presented here mainly to capture the experience from other countries, although e.g. Kluge and Schmidt (2002) argue that labour markets are heterogeneous in different countries. We are aware of this heterogeneity and this is why foreign experience is transferred to our analysis with the greatest caution.

In our analyses we do not adjust data on inflation as Battistini, Gavosto and Rettore (2001) do. We use nominal values because of short period of project implementation (only two years or less) and a stable price level in the Czech Republic.

As Holzer et al (1993) mention the positive impact of education on productivity; our first hypothesis is *that educated workforce leads to increased sales* (1). According to Barrett and O'Connell (1999), larger companies implemented more general trainings than smaller companies - *Larger firms implement more general type of education* (2). According to data from the database Albertina and Monit7 + (data from 1st October 2011) supported companies had average revenue always higher than the rejected companies. Therefore, the third hypothesis regarding turnover is that *supported firms have higher sales than rejected firms even before the application* (3).

Battistini, Gavosto and Rettore (2001) mention three factors that affect company's profit when being subsidised. These are individual firm level of inefficiency, reduction of inefficiencies through education and reduction of subsidies. Therefore our hypothesis regarding profit are that *more educated workforce leads to increased profits of the company* (4) and *educated workforce leads to increased investments of the company*.

In case of employment we assume that *educated workforce leads to the stabilisation of employment in the company* (6). Girma, Görg, Strobl and Walsh (2008) pointed out that supported jobs in Ireland usually last 4 years after grant and they are cancelled, then. Our hypothesis is that *jobs exist even in the phase of project sustainability* (7). Betcherman, Daysal and Pages (2009) pointed out that when reporting results of support, companies have a tendency to overestimate the number of jobs created. We test, if the *reported job creation for the OP HRE and their actual creation are different* (8).

Regarding investment in education, we assume that *Innovations of human resources management contribute to increasing the performance of companies in the longer term* (9) and *Innovations of human resources management in the 1st year after the introduction do not affect the performance of companies* (10).

According to Barrett and O'Connell's (1999) discussion of the general and specific training in their study, *general education leads to staff fluctuation* (11) compared to the specific training. We also assume that *the introduction of human resource management system reduces staff fluctuation* (12).

1 Methodology

Counterfactual impact evaluation method is demanding on the quality and quantity of data. Therefore, we used data from monitoring system Monit7+ combined with data from the Czech Statistical Office. In the case of projects in the grant calls OP HRE 1.1., we applied difference-in-difference method using propensity score matching (PSM-DD). We applied the method on both grant projects and system project. Grants projects are those, where firms are applicants for the whole project (including the project management). The assistance in the system project "Vzdělávejte se!" is different. Applicants apply just for trainings without getting funding for the project management.

In accordance with the research, the estimates are realized by the propensity score matching method and its variant called difference - in - differences. This method is also known as PSM-DD.

We have realized the estimation on a sample of firms that has been selected in close cooperation with the Czech Statistical Office. The sample includes 46 000 companies, including both successful candidates and non-applicants. The data include the years 2008 and 2009. We have investigated the impacts on the following values:

- the total employment in companies (in the form of natural logarithms),
- the sales (in the form of natural logarithms),
- and the profit (profit indicator).

It is worth nothing that the difference of logarithms is an approximation of percentage change for the variables that we have analysed in the form of the logarithm. So we are able to interpret the results of DD-PSM as a comparison of the approximate percentage change of the monitored indicators for two sets of examined firms between 2008 and 2009.

We do not analyse the profit in logarithms, because it can be (and in 2009 in fact it was) for some companies negative¹.

2 The Estimate of the Impact of Aid - a Comparison between the Supported Firms and Non-applicants

In this section we discuss the results of estimates of support by comparison of successful applicants with non-applicants.

Basic statistics (mean, median, standard deviation - STD and interquartile range - IQR) are reported in the table below:

2.1 Results for the call „Vzdělávejte se!“

Tab. 1: Basic statistical characteristics of the investigated companies

		Mean	STD	Median	IQR
Profit	Supported firms	-0,02	0,31	-0,01	0,06
	Non-applicants	-0,05	8,62	-0,01	0,13
Sales	Supported firms	2,31	1,87	2,46	2,59
	Non-applicants	1,58	2,25	1,44	2,67
Employment	Supported firms	-0,28	5,76	-0,24	9,87
	Non-applicants	-2,03	6,41	-1,98	11,18

Source: CZSO, own calculations

The table shows that supported companies had on average better results in all indicators than non-applicants. They had also better the median results, although there is the difference not as strong as in the average. This is due to the fact that there are more non-applicants with extremely low values of indicators, which pushes the average down more than the median. It is also interesting that 97.5% quantile of all indicators is better for supported firms (these firms had more very high values of indicators than non-applicants). It is interesting that the degrees of variability (both standard deviation and interquartile range) are lower for the supported firms.

PSM method is based on an estimation of discrete choice model due to the group to which the firm belongs to (whether the firm is a successful applicant or non-applicant) and on a following comparison of values of indicators for successful applicants and non-applicants

¹ Surprisingly, it is possible that sales can be also negative. This situation occurred in 3 companies from the sample. But these are unique cases (according to the experts of CSO these companies are probably in liquidation). So we have excluded these three companies from statistical analysis.

who have a similar propensity score value, it means the likelihood of that the company is one of the successful applicant². Selection of observations with similar propensity score values can be done several ways. We have chosen the two most commonly used for this report:

- The nearest neighbour method - it is based on comparison of each successful applicant is compared with the non-applicant, which has the closest value of the propensity score. The result of estimation is then the average of comparisons over all successful applicants.
- Kernel method - each successful applicant is compared with all non-applicants, but different weights depending on the difference propensity score (the smaller the difference, the greater weight) are attributed to different non-applicants.

The results for both methods are shown in the following table. The first table shows the methods of using the nearest neighbour, while the second table shows the estimated kernel method.

Tab. 2: Results for PSM - The nearest neighbour method

	Profit	Sales	Employment
Point estimate	0,033	0,705	1,502
Standard deviation	0,309	1,867	2,036
P-value	0,293	0,326	0,424

Source: CZSO, own calculations

Tab. 3: Results for PSM - Kernel method

	Profit	Sales	Employment
Point estimate	0,021	0,726	1,481
Standard deviation	0,313	1,867	2,214
P-value	0,296	0,370	0,436

Source: CZSO, own calculations

Both approaches provide very similar results. Point estimates indicate a positive effect of support on all three indicators (profit, sales, employment). Unfortunately, the results are not significant at any reasonable level. The question is whether this is caused because it is really

² Observations with extreme values of the propensity score is usually deleted if the additional technical conditions are fulfilled, which include a common base (common support), which also means that both groups of companies have enough representatives on the allowable values of propensity score.

insignificant impact of the aid, or because time has not passed enough to show the impact of the aid, yet. It is possible that data for following years will bring this issue clearer.

2.2 Results for grant projects

Tab. 4: Basic statistical characteristics of the investigated companies

		Mean	STD	Median	IQR
Profit	Supported firms	-0,02	0,48	-0,00	0,23
	Non-applicants	-0,05	8,48	-0,01	0,13
Sales	Supported firms	3.18	1,88	2,95	2,20
	Non-applicants	1,55	2,22	1,39	2,64
Employment	Supported firms	-0,29	5,72	-0,21	9,86
	Non-applicants	-2,02	6,37	-1,96	11,06

Source: CZSO, own calculations

Similarly to the call "Vzdělávejte se!" the research shows the following for the grant aid: supported companies had on average better results in all indicators than non-applicants and also the median better results, although the difference is not as strong as in the average. This is due to the fact that there are more non-applicants companies with extremely low values of indicators, which pushes the average down more than the median. Similarly, the degrees of variability (both standard deviation and interquartile range) are lower for the supported firms.

Tab. 5: Results for PSM - The nearest neighbour method

	Profit	Sales	Employment
Point estimate	0,217	2,521	1,411
Standard deviation	0,483	1,889	2,241
P-value	0,971	0,898	0,873

Source: CZSO, own calculations

Tab. 6: Results for PSM - Kernel method

	Profit	Sales	Employment
Point estimate	0,021	1,631	1,392
Standard deviation	0,486	1,889	2,451
P-value	0,815	0,839	0,916

Source: CZSO, own calculations

The point estimate of sales and employment is similar through Kernel method as for call "Vzdělávejte se!", however results for grants are higher through the nearest neighbour methods. Unfortunately, as in the previous case they are not significant. The results for the employment challenges are very similar to calls (a point estimate is positive but insignificant).

3 Conclusions

Propensity score matching method provided very similar results for both datasets – grant calls and system project "Vzdělávejte se!". Both approaches – nearest neighbour method and Kernel method - provide very similar results. Point estimates indicate a positive effect of support on all three indicators - profit, sales and employment. The results are not significant at any reasonable level. Therefore, the hypotheses of this paper cannot be neither accepted nor rejected as there is low significance of the statistical tests. It is not clear whether this is caused by insignificant impact of the aid or because time has not passed enough to show the impact of the aid, yet. It is possible that data for the following years will bring the issue of significance clearer.

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