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APPLICATION OF SURVIVAL ANALYSIS IN EFFICIENCY EVALUATION OF PROFESSIONAL EFFECTIVENESS ENHANCEMENT PROGRAMME

Abstract. The purpose of the paper is to evaluate the effect of a professional effectiveness enhancing programme on unemployment spells. The analysed programme was implemented by the Poviát Labour Office in Szczecin in 2009 and 2010 and was targeted at persons aged below 30. The methods of survival analysis are the starting point for the study. The differences in unemployment spells will be examined by means of the regression discontinuity model. The parameter values of this model will help evaluate the efficiency of the programme financed by the Labour Fund. The analysis is based on the data of people de-registered from the Poviát Labour Office in Szczecin in 2010. The control group consists of people de-registered in 2008, i.e. the year when the project was not realised.

Key words: survival analysis, regression discontinuity, unemployment, efficiency of the labour office programmes.

1. INTRODUCTION

This article is in line with the trend in the modern reference literature, which is the measurement of the unemployment benefit effects on the length of unemployment spells (Moffitt 1985; Katz, Meyer 1990; Hunt 1995; Card, Levine 2000; Hahn, Todd, Van der Klaauw 2001; Lalive 2007). Unemployment brings negative effects to both the national economy and the well-being of households. This is why governments can and should use adequate tools to alleviate these effects, focusing in particular on the duration of unemployment. Unfortunately, there are no ready-made solutions to the problem. Both the unemployment rates and its mean duration vary from country to country, disregarding their development level. Governments offer diverse forms of support and activation programmes directed to the unemployed citizens in general as well as to their specific groups. The outcomes of individual programmes can be difficult to predict. Therefore, it seems essential to conduct

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studies on the effectiveness of these tools. One of the researchers dealing with this issue was Lalive (2007) whose interesting study focused on the possible effect of prolonging the unemployment benefit from 30 to as many as 209 weeks. Such an extended benefit was introduced by the Austrian government in 1988 and it was targeted at the 50 and more unemployed who had been residents of the selected regions for at least six months and who had been employed before. Obviously, such an extension of the unemployment benefit resulted in the prolonged unemployment spells, especially in the case of women, which was due to the opportunity of early retirement. In the reference literature authors often point out that the maximum length of unemployment benefits is strongly correlated with structural unemployment (Nickell, Layard 1999). The extended benefit time usually discourages the beneficiaries from job-seeking, thus leading to prolonged unemployment spells. For this reason, it is important to address support programmes to carefully selected groups of beneficiaries. In his research Lalive used the nonlinear regression model in its sharp form, with the thresholds of age eligibility and of distance to danger area border. Szmieder, von Wachter and Bender (2012) applied the nonlinear regression models with several age thresholds to study the effect of the potential benefit duration on the unemployment time throughout the whole economic cycle of 1980–2008 in Germany. The authors point out that they have based their research on the model of job-seeking with limitations to liquidity and that the German system of unemployment benefits is ideal for this kind of studies. They adopt the age thresholds reflecting the potential benefit duration as the non-linearity thresholds (42, 44 and 49).

The purpose of the paper is to evaluate the effect of a professional effectiveness enhancing programme on unemployment spells. In 2009–2010 the Poviát labour Office in Szczecin implemented the programme to boost employment opportunities of people below the age of 30. The programme involved 1105 individuals (379 in 2009, 726 in 2010). Its main objective was to improve employment opportunities of the unemployed registered in the local labour office. The programme aimed at fighting discrimination on the job market affecting the under 30-year-olds by adjusting their qualifications to the job market demand. Their career opportunities were enhanced by their participation in training courses, post-diploma studies, internships and intervention works. What is more, the project enabled the participants to apply for funds for setting up and running a business. The amount for the execution of the programme was 968.2 thousand PLN in 2009 and 3 million PLN in 2010. The present study was completed in two stages. In the first stage the authors assessed the likelihood of failure in finding a job by the unemployed individuals before and after the project implementation. In the second stage, the effectiveness of the project implementation was evaluated.

2. PROBABILITY OF FAILING TO FIND A JOB IN SELECTED AGE GROUPS

The analysis included two groups of individuals who were removed from the register of the Poviát Labour Office in Szczecin. The study group was composed of individuals de-registered in 2010, while the control group included people removed from that register in 2008 (individuals not included in the programme). The group sizes can be found in Table 1. Only a part of the unemployed individuals was de-registered because they had found a job. In 2008 such people accounted for 31.53%, while the figure in 2010 was 41.79%.

Table 1. Size of the observed population

Removed	2008	2010
	Number of people (of which to work)	
Total	17 236 (5 434)	17 793 (7 435)
Below age 30	6 836 (2 413)	7 620 (3 042)
30 and more	10 400 (3 021)	10 173 (4 393)
25–30	3 475 (1 356)	4 046 (1 876)
30–35	2 364 (752)	2 539 (1 132)

Source: own study.

To find the probability of failure in finding a job at the first stage of the study the authors used the Kaplan-Meier estimator determined according to the formula:

$$\hat{S}(t_i) = \prod_{j=1}^i \left(1 - \frac{d_j}{n_j} \right), \text{ for } i = 1, \dots, k \quad (1)$$

where: t_i – moment in which there was at least one event (unregistering), d_i – number of events in time t_i , n_i – number of units of observation at time t_i .

The observation was considered to be full when it ended with finding employment. If the subject was removed from the Poviát Labour Office register, the observation was regarded to be censored (Bieszk-Stolorz, Markowicz 2012). Both in 2008 and in 2010 the observed unemployed individuals were divided into two age groups: under 30 and 30+. The Kaplan-Meier estimators (Figure 1) indicate that young people were leaving unemployment at a faster rate than the older ones. Also, the probability of job-seeking failure was lower in 2010 than in 2008.

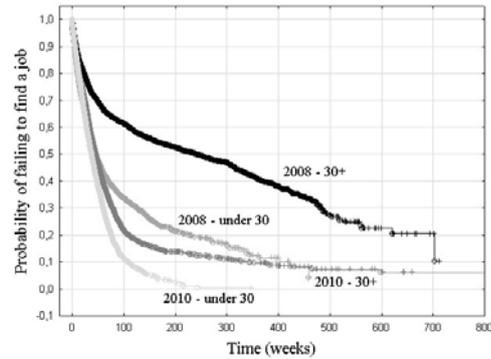


Figure 1. Kaplan-Meier estimators for unemployed persons
Source: own study.

In the group of 30+ the course of the duration curve was undoubtedly determined by the performance of the older group members. Since in the period in question the likelihood of finding employment was getting lower as the subjects were getting older (Bieszk-Stolorz 2013), so the authors decided to change the age criteria in the further part of the analysis. The subjects were divided into the two groups of 25-30-year-olds and 30-35-year-olds. Figure 2 shows the Kaplan-Meier estimators determined for both groups in 2008 and 2010.

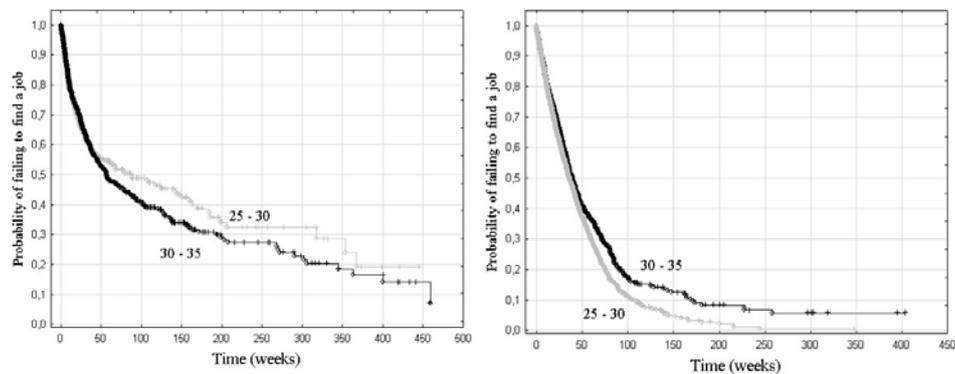


Figure 2. Probability of failing to find a job

Source: own study.

The analysis outcome shows that the course of the duration curves for both age groups was similar, but in 2008 the 25-30-year-olds were less likely to find a job than the 30-35-year-olds. In 2010 the situation got reversed.

3. EFFECT OF IMPLEMENTED PROGRAMME ON MEAN DURATION OF UNEMPLOYMENT SPELL

The second stage of the study included the assessment of the effect of the implemented programme on the average duration of unemployment spells. For this purpose the authors used the regression discontinuity design (*RDD*). There are two main types of discontinuity design considered in the literature: the sharp design and the fuzzy design (Trochim 1984, Hahn, Todd, Van der Klaauw 2001). They decided to choose the sharp regression discontinuity design (Lalive 2007):

$$\hat{Y}_i = \alpha_0 + \alpha_1 D_i + \beta_0 (W_i - W_0) + \beta_1 D_i (W_i - W_0) \quad (2)$$

where: Y_i – mean duration of unemployment spells, W_i – age, α_1 – mean effect of benefits on unemployment spell duration on threshold W_0 , $W_0 = 30$,

$$D_i = \begin{cases} 1 & \text{for } 25 \leq W_i < 30 \\ 0 & \text{for } 30 \leq W_i < 35 \end{cases}$$

Figure 3 shows a visual representation of non-linearity in the eligibility threshold $W_0 = 30$.

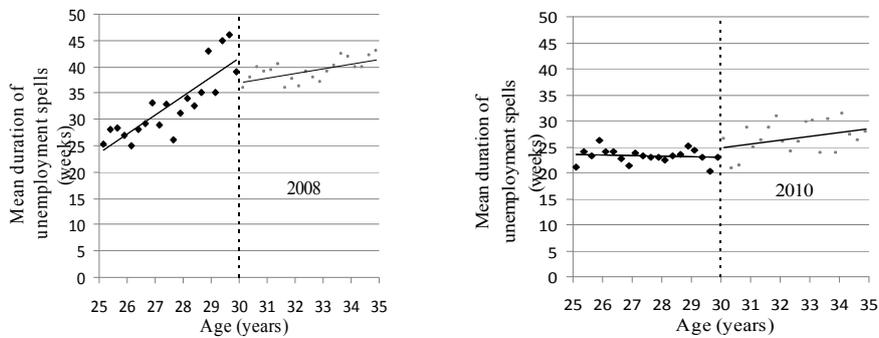


Figure 3. Visualisation of non-linearity on the eligibility threshold
Source: own study.

Model (2) was estimated for 2008 and 2010. The following results were obtained:

$$\hat{Y}_i = 37,0488 + 4,6754D_i + 0,8781(W_i - 30) + 2,7489D_i(W_i - 30) \quad (3)$$

[1,2257]
[1,7335]
[0,4247]
[0,6007]

$$\hat{Y}_i = 24,9043 - 1,9899D_i + 0,7264(W_i - 30) - 0,8563D_i(W_i - 30) \quad (4)$$

[1,0185] [1,4404]
[0,3529]
[0,4991]

In 2008 the mean duration of unemployment spells was expanding as the under 30-year-olds were getting older. On the threshold $W_0 = 30$ it dropped by 4.6754 weeks. All the estimated parameters are significant ((model 3) the estimation errors are given in brackets). What is particularly important is the significance of the parameter α_1 . This indicates a considerable difference in the unemployment duration increment in both groups. In 2010 the mean unemployment spell was generally shorter, but the most interesting trend was observed in the younger group. The inclination angle of the regression line changed. The insignificance of the parameter β_1 (model 4) implies the identical increment of the mean unemployment duration in both age groups. Therefore, we can write a linear regression model for 2010:

$$\hat{Y}_i = 24,9797 + 0,5969(W_i - 30) \quad (5)$$

[0,3730]
[0,1293]

The study results (model 3–5) prove that young people's situation on the job market has improved, thus confirming the effectiveness of the implemented programme.

4. CONCLUSIONS

The following conclusions can be drawn from the above study:

- the Kaplan-Meier estimator facilitated the initial assessment of the positive impact of the Poviát Labour Office project on the young people's situation on the job market,
- the regression discontinuity design (*RDD*) model helped to identify the impact of the programme to enhance employment opportunities which was targeted at a group of selected job-seekers on the duration of unemployment spells, i.e. it helped to assess the programme effectiveness.
- in 2008 the parameter α_1 was 4.6754 weeks, while in 2010 it decreased and was no longer significant, which means that despite shorter mean unemployment spells in both groups, the effect of the Poviát Labour Office programme is apparent.

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WYKORZYSTANIE ANALIZY TRWANIA DO OCENY SKUTECZNOŚCI PROGRAMU ZWIĘKSZAJĄCEGO EFEKTYWNOŚĆ ZAWODOWĄ

Streszczenie. Celem artykułu jest ocena wpływu realizacji programu zwiększającego efektywność zawodową na czas trwania bezrobocia. Analizie poddano program realizowany przez Powiatowy Urząd Pracy w Szczecinie w latach 2008 i 2010 i skierowany do osób do 30 roku życia. W badaniu punktem wyjścia są metody analizy trwania. Do zbadania różnic w czasie trwania bezrobocia zastosowany zostanie model regresji nieciągłej. Wartości parametrów tego modelu umożliwią ocenę skuteczności wprowadzonego programu finansowanego ze środków Funduszu Pracy. Analiza zostanie przeprowadzona na danych dotyczących osób wyrejestrowanych z PUP w Szczecinie w 2010 roku. Grupę kontrolną będą stanowili wyrejestrowani w 2008 roku, w którym nie był realizowany omawiany projekt.

Słowa kluczowe: analiza trwania, regresja nieciągła, bezrobocie, skuteczność programów urzędów pracy.

