A C T A U N I V E R S I T A T I S L O D Z I E N S I S
FOLIA OECONOMICA 3(302), 2014

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RELATIONSHIP BETWEEN DURATION OF JOB SEEKING AND RECEIVING UNEMPLOYMENT BENEFIT. SEARCH THEORY ON LABOUR MARKET

Abstract. The aim of the article is to analyze the influence of time of getting unemployment benefit on the time of registered unemployment. In research we used duration analysis methods (Kaplan-Meier estimator, Cox regression model). Analyses were conducted on the basis of data from Local Labour Office (LLO) in Sulęcin. They were collected under the EU project. In the article two hypothesis are verified: the fact and time of receiving unemployment benefit lengthens the time of job finding, and the strength of this influence varies in different subgroups which were formed according to the categories of unemployment.

Keywords: Kaplan-Meier estimator, Cox hazards model, hazard ratio, unemployment.

I. INTRODUCTION

The influence of benefits, reservation wage and education on the duration of unemployment is explained by search theory on labour market[1]. It refers to some rules, which individuals follow in process of job searching. This is a micro-economic approach. Its equivalent in contemporary idea of macro-economy is the theory of matching, also known as search and matching theory[2]. Research studies of Nickell [1979], Hughes and Perlman [1984] show, that the increase in benefits for the unemployed leads to lengthening the time of job searching. The strength of this relationship decreases with lengthening of the period of unemployment. The aim of the article is to analyze the influence of getting unemployment benefit on the time of registered unemployment. The research was conducted on the basis of the data from Local Labour Office in Sulęcin, collected within the framework of the EU project[3]. The analysis was carried out

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[1] Stigler is regarded as the creator of the serach theory (Nobel Prize in 1982).

[2] Diamond, Mortensen, Pssarides, won the 2010 Nobel Prize in Economics for fundamental contributions to search and matching theory.

[3] Project *Analysis and diagnosis of the problem of long-term unemployment in the poviat Sulęcin*, implemented within the Human Capital Operational Programme 2007–2013.

for unemployment registered in the year 2009 and the observations lasted till the end of 2011. In the article the following hypotheses were tested: the fact and time of benefit receiving by unemployed persons lengthen the time of job seeking; the strength of this influence is varied in subgroups extracted by the category of unemployed features.

II. THEORY OF SEARCH ON LABOUR MARKET

Theory of search on labour market explains why unemployed persons delay taking up of employment and lengthen the time of unemployment. In this area many research studies are conducted. Meyer [1990] studied the influence of level and length of the time of benefits receiving by the unemployed on the duration of unemployment. He analysed the events in the period before the end of receiving the benefits. He stated that bigger benefits for the unemployed have a strong negative influence on probability of leaving the unemployment. This probability increases strongly at the end of the period of benefit receiving. Showed empirical hazard specifies the ratio of number of leaving the unemployment during the given week, to the number of unemployed at the beginning of the week. High intensity is noticeable in the first few weeks, later between 25 and 29 and between 35 and 38 week. These jumps of intensity are because of the end of the benefits receiving, Meyer explains. Among the conclusions from used model of proportional hazards he reports, that the 10-percent increase in benefits for unemployed is linked with 8.8-percent decrease in leaving from unemployment intensity. The results refer only to the benefit period. Mortensen [1977] said that higher benefits may lead to a higher intensity in this period, and Katz [1986] said that the intensity of leaving the unemployment increased at the end of the benefit period. Han and Hausman [1990] pointed out to the increase of unemployed leaving in 26 and 39 week (moments which end the benefit period in different states of USA). They also noticed a high intensity of leaving the unemployment at the initial period of benefit receiving. The authors divided the observed persons into those, who take new jobs and those who return to their former employer. The returns occurred at the beginning of the unemployment period despite receiving the benefit. In case of the second group the intensity of taking up jobs increased only at the end of the benefit period. Røed and Zhang [2003] conducted the research about the influence of benefit amount on intensity of job taking by persons under 60 years of age, who lost their steady job and qualify to receiving the benefit. It showed that the benefit amount had a negative influence on intensity of leaving the unemployment, especially in case of men. However, the risk of loss of the benefit motivated, especially women, to get a job. The intensity of leaving

unemployment increased at the end of the benefit period by 60% for women and by 40% for men. A 10-percent reduction of benefits, shortened the duration of unemployment by 1 month in case of men and by 1-2 weeks in case of women.

III. RESEARCH METHOD

In research we used a survival analysis methods: Kaplan-Meier estimator (survival curves of unemployment, the identification of hazards proportionality, the mean duration of unemployment, hazard of unemployment leaving), the Cox proportional and non-proportional hazards models (hazard ratio out of unemployment). Kaplan and Meier [1958] proposed the method of duration function estimating in case of censored data:

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

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.

To study the registering out hazard from labour office the following formula was used :

$$h_j = \frac{d_j}{n_j} \tag{2}$$

where:

d_j – number of de-registered in a given month,

n_j – number of unemployed under observation at the beginning of the month.

To study the influence of benefit receiving time on duration of unemployment the models of proportional Cox hazard were used :

$$h(t, Z) = h_0(t) \exp \beta X \tag{3}$$

where: X – time unemployment benefit (continuous variable)

$$h(t, X) = h_0(t) \exp \sum_{i=1}^{2} \beta_i X_i \tag{4}$$

where:

$$X_1 = \begin{cases} 1 & \text{benefit duration } (0,6\rangle \\ 0 & \text{others} \end{cases},$$

$$X_2 = \begin{cases} 1 & \text{benefit duration } > 6 \\ 0 & \text{others} \end{cases}.$$

To evaluate the intensity of relative of leaving from registered unemployment a non- proportional hazard model[4] was use (lack of proportionality basis on survival curves) of the form:

$$h(t,Z) = h_0(t)\exp(\beta Z + \delta Z \times g(t)) \tag{5}$$

where:

$$g(t) = \begin{cases} 0 & \text{for } t < t_0 \\ 1 & \text{for } t \geq t_0 \end{cases},$$

$$Z = \begin{cases} 0 & \text{no benefit} \\ 1 & \text{benefit} \end{cases}.$$

In model (5) the parameter β specifies the influence of endogenous variable on intensity, and a parameter δ shows, that this influence changes in time. Exp(β) is interpreted as hazard ratio of registering out the unemployed with the unemployment benefits relative to unemployed without it, who were unregistered in time shorter than t_0. However exp($\beta+\delta$) is a hazard ratio in case when unemployment duration crossed t_0.

IV. INFLUENCE OF BENEFITS IN THE PROCESS OF JOB SEEKING – RESEARCH RESULTS

The research were included individual data of 3890 unemployed registered in the year 2009 in Local Labour Office in Sulęcin. The number of the subgroups is presented in Table 1 (persons not unregistered till the end of observation period – censored units).

[4] More about the Cox non-proportional hazard models [Bieszk-Stolorz and Markowicz, 2012].

Table 1. Unemployed persons by characteristics and benefit rights

Group	Benefit	No benefit	Total	Of which censored
Grand total	1184	2706	3890	67
K	575	1222	1797	40
M	609	1484	2093	27
W_1	195	783	978	8
W_2	362	815	1177	17
W_3	215	471	686	5
W_4	312	498	810	23
W_5	95	125	220	13
S_1	285	788	1073	21
S_2	459	1010	1469	21
S_3	80	224	304	2
S_4	272	541	813	21
S_5	88	146	231	2

Women (K), Men (M); Age: 18-24 (W_1), 25-34 (W_2), 35-44 (W_3), 45-54 (W_4), 55-59 (W_5); Education: Lower secondary, primary and incomplete primary (S_1), Basic vocational (S_2), General secondary (S_3), Post-secondary and vocational secondary (S_4), Tertiary (S_5).

Source: own study.

The Kaplan-Meier estimators were used to compare the probability of unregistering by persons with the benefit and without the benefit in total (Figure 1) and in subgroups. In the first months of unemployment we can see the differences in duration models for persons with benefit and without. It means the non-proportionality in hazards for those groups. Similar shapes of duration curves were observed also for subgroups according to sex, age and education.

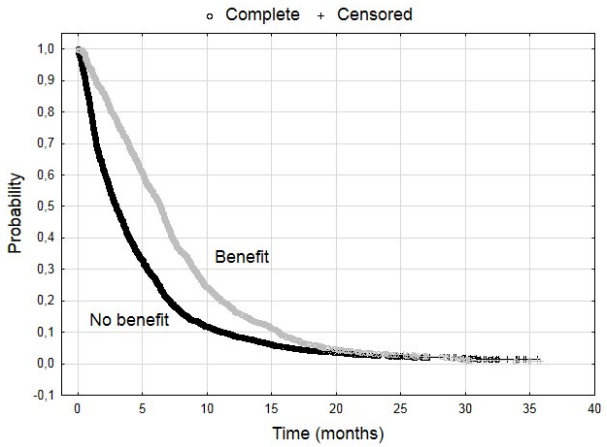

Figure. 1. Kaplan-Meier estimators for unemployed persons

Source: own study.

Mean and median also indicate differences in time of leaving the unemployment shown in Table 2. Longer duration of unemployment applies to people receiving unemployment benefits in each of the subgroups.

Table 2. Duration of job search – median and mean by characteristics of unemployed persons

Group	Median		Mean	
	Benefit	No benefit	Benefit	No benefit
Total	6.41	2.94	7.59	4.86
K	6.67	3.25	7.84	5.28
M	5.82	2.73	7.35	4.51
W_1	5.85	2.10	6.01	3.62
W_2	6.23	2.73	6.85	4.67
W_3	5.85	3.52	7.00	5.07
W_4	6.94	3.86	8.84	5.96
W_5	8.65	5.06	10.44	8.33
S_1	6.48	3.25	7.45	5.04
S_2	6.46	1.86	7.21	3.70
S_3	6.28	2.93	7.59	4.90
S_4	6.02	1.94	6.52	3.88
S_5	6.41	2.94	7.59	4.86

Source: own study.

Models of proportional Cox hazard were used to research the influence of time of benefit receiving on the time of being unemployed. Model (3) parameters with continuous variable informed, that the lengthening of the time of benefit receiving by 1 month causes the intensity of registering out reduction by about 11% (for particular subgroups from 7% to 14%, Table 3). Benefit is granted for 6 or 12 months. To research the differences in intensity of leaving the unemployment for persons with shorter and longer time of benefit receiving we used a model (4), which allows the partition of this time into 3 groups: absence of benefit, time from 0 to 6 months and more than 6 months. The results of estimations pointed out, that the efforts connected with job seeking of persons with a shorter time of benefit (by 27%) and persons with a longer time of benefit (by 77%) are less intensive than the efforts of persons without a benefit (Table 4).

Table 3. Hazard ratios for model (3) and model (4) – Cox proportional hazard models

Group	Hazard ratio		
	Model (3)	Model (4)	
		X_1	X_2
Total	0.8911	0.7290	0.3344
K	0.8992	0.7169	0.4026
M	0.8852	0.7579	0.2931
W_1	0.8628	0.5884	0.4621
W_2	0.8828	0.6712	0.5311
W_3	0.8877	0.7130	0.4934
W_4	0.9100	0.8866	0.4106
W_5	0.9268	1.9642	0.4883
S_1	0.8781	0.7071	0.3409
S_2	0.8913	0.7792	0.3188
S_3	0.8968	0.5913	0.2744
S_4	0.8686	0.7386	0.3714
S_5	0.8908	0.6130	0.4427
	0.8603	0.7290	0.3344

Source: own study.

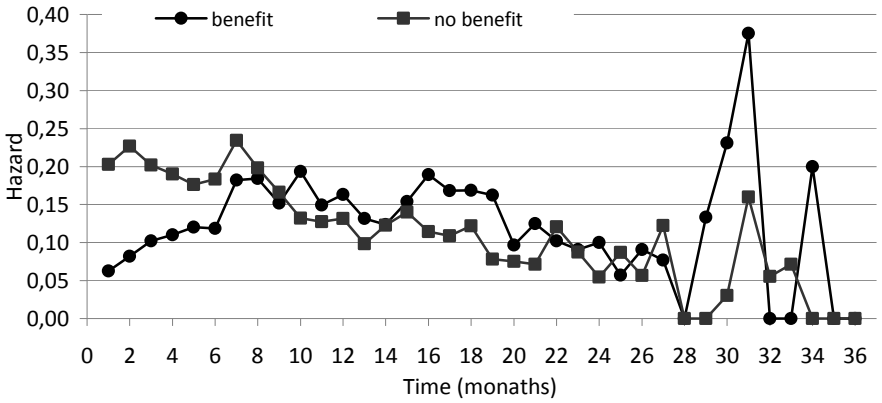

Figure 2. Hazard of leaving unemployment in months

Source: own study.

Confirmation of non-proportionality can also be seen in the graph of empiric hazards for persons receiving benefit and without benefit (Figure 2). In the first 9 months we can see higher intensity of unregistering among the unemployed not receiving the benefits. The situation is reversed after 9 months. Therefore, $t_0 = 9$ was accepted in the Cox regression model (5). In the first period (to 9 months) the hazard values were lower than 1. This implies smaller intensity of registering out the persons receiving the benefit compared to other persons.(Table 4). After 9 months, the situation is reversed in all subgroups.

Table 4. Estimation results of the Cox non-proportional hazard model

Group	Estimated parameters (Standard error)		*p*-value		Hazard ratio	
	B	δ	β	δ	< 9 m	≥ 9 m
Total	–0.6478 (0.0407)	0.9550 (0.0882)	0.0000	0.0000	0.5232	1.3595
K	–0.6227 (0.0597)	0.9924 (0.1241)	0.0000	0.0000	0.5365	1.4473
M	–0.6621 (0.0557)	0.8973 (0.1256)	0.0000	0.0000	0.5157	1.2651
W_1	–0.7238 (0.0894)	1.5411 (0.2300)	0.0000	0.0000	0.4849	2.2644
W_2	–0.5547 (0.0711)	0.9299 (0.1710)	0.0000	0.0000	0.5743	1.4553
W_3	–0.4862 (0.0947)	0.6997 (0.2054)	0.0000	0.0007	0.6149	1.2380
W_4	–0.6704 (0.0885)	1.0800 (0.1746)	0.0000	0.0000	0.5115	1.5063
W_5	–0.5163 (0.1794)	0.7810 (0.0000)	0.0040	0.0088	0.5967	1.3030
S_1	–0.6975 (0.0829)	0.9369 (0.1677)	0.0000	0.0000	0.4978	1.2706
S_2	–0.6350 (0.0658)	1.0653 (0.1419)	0.0000	0.0000	0.5299	1.5377
S_3	–0.8288 (0.1519)	0.9717 (0.3361)	0.0000	0.0038	0.4366	1.1536
S_4	–0.5774 (0.0856)	0.7583 (0.1948)	0.0000	0.0001	0.5613	1.1983
S_5	–0.6883 (0.1526)	1.1422 (0.3866)	0.0000	0.0031	0.5024	1.5745

Source: own study.

CONCLUSIONS

The conducted research confirmed the hypothesis. Receiving the unemployment benefit and the time of receiving it lengthened the time of being without job. The fact of not receiving the benefit increased the probability of unregistering in all of the subgroups. Persons with a shorter time of benefit left the unemployment more intensively than persons, who received the benefit longer. The fact of receiving the benefit decreased the intensity of taking up employment in the first 9 months of registering.

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ZALEŻNOŚĆ CZASU POSZUKIWANIA PRACY OD CZASU POBIERANIA ZASIŁKU. TEORIA POSZUKIWAŃ NA RYNKU PRACY

Celem artykułu jest analiza wpływu czasu pobierania zasiłku na czas trwania bezrobocia rejestrowanego. W badaniu wykorzystano metody analizy trwania (estymator Kaplana-Meiera, model regresji Coxa). Analizy przeprowadzono w oparciu o dane z PUP w Sulęcinie. Pozyskano je w ramach realizacji projektu unijnego. W artykule zostaną zweryfikowane hipotezy, że: fakt i czas pobierania zasiłku przez osoby bezrobotne wydłużają czas poszukiwania pracy, siła tego oddziaływania jest zróżnicowana w podgrupach wyodrębnionych według kategorii cech bezrobotnych.