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Multiple unemployment spells duration in Poland

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Abstract:

I study multiple unemployment spells. I refer to Poland, as this country experiences high incidence of the long-term unemployment and long mean incomplete unemployment duration. I estimate conditional risk set model for multiple spells, and Cox model for 1st to 5th spell, separately. I use time-to-event data (complete spells) for almost 435000 individuals in the 2007-2014 period from five public employment offices. Almost 99% of the individuals have up to 5 spells, but "only" 60% of them experience one complete spell.

I find that subsequent unemployment spells are on average shorter, but slightly more individuals experience longer subsequent spells. Thus, those who exit either learn how to seek job or decide to leave the pool. Younger males with primary education are better off at leaving the pool, but the impact of sex and education diminishes in subsequent spells. Tertiary education, since 2nd spell, also entails higher hazard of leaving the pool. Results indicate heterogeneity among job seekers and mismatch between job seekers and job vacancies (as public employment offices often have low quality job offers).

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Keywords: unemployment duration, multiple unemployment spells, outflow from unemployment, hazard function

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1. Introduction

I present preliminary results of the unemployment duration analysis in Poland. Unemployment lasts, while unemployment pool is stagnant. Mean incomplete unemployment duration equals more than 11 months (LFS data); and almost 30% of workers seek job longer than 12 months. More than 55% of the registered unemployed individuals are long-term unemployed. But, around 80% of the newly unemployed individuals have been registered previously. I hypothetise that frequent unemployment flows (inflow and outflow) concern relatively small fraction of the unemployed individuals. I see some potential scenarios. An individual registers at the public employment office, then outflows (optimally due to finding a job), and does not return to the pool. This person experiences one spell of the registered unemployment and then manages on her own[1]. In the second option, an individual registers and deregisters, and experiences multiple unemployment spells. This person rotates in the labour market, but does not manage on her own. If only small number of workers rotate, the rest remain in the pool "permanently", and they are long-term unemployed. In each case, different policy measures are required to increase employability and self-reliance in the labour market. I aim at finding which scenario takes place in Poland. I refer to Poland, as this country experiences high incidence of the long-term unemployment. Few workers are eligible to unemployment benefits (20% of the inflow and 14% of the stock), but registration is a prerequisite for obtaining free health insurance for non-employed individuals.

I focus on completed spells of the registered unemployment, and use micro data for individuals from five public employment offices (Warsaw, Rzeszow, Białystok, Konin, Zduńska Wola). I have time-to-event data for almost 435000 individuals in the 2007-2014 period. I do not have a random sample, but argue that my computations can shed some light on the unemployment duration characteristics.

[1] It might also be the case that this person is discouraged from public employment intermediation and is non-employed but remains outside the registry.

I contribute to the literature in a few ways. Hamerle (1989) argued that analysing data in a single-spell framework biases the results and leads to false conclusions. Whereas Trivedi and Alexander (1989) proved that fitting a common duration model to data from different spells involves a major misspecification. I have multiple failure per subject data that allow me to account for the impact of previous unemployment spells on hazard of leaving the pool. I observe several spells per subject, thus I can address the assumption of independence of failure times required by standard survival analysis. I employ semi-parametric survival analysis techniques. I estimate Prentice et al. (1981) conditional risk set model for all spells altogether; and Cox model for each consecutive unemployment spell (from 1st to the 5th spell). I compare the results to identify the impact of age, sex and education on hazard of leaving the unemployment pool. I have encountered a few papers analysing multiple unemployment spells (including the above mentioned Hamerle (1989) and Trivedi and Alexander (1989)), but none analysed such broad dataset. I have not found any analysis concerning the Polish labour market.

I find that mean complete unemployment spells are shorter than mean incomplete unemployment duration and they decrease for subsequent unemployment spells. Young males with primary education experience the highest hazard of leaving the pool, but the difference between sexes and the impact of education diminishes for consecutive spells. Results indicate mismatch between job seekers and job offers, as apart from primary education only those who hold tertiary education (since 2nd spell) more likely leave the pool. But those with tertiary education can manage on their own in the market.

2. Data overview

In the sample I had more than 430 000 individuals, 53% of whom were males. Almost 1/3 of the sample were workers aged less than 25, and 80% of the registered individuals were younger than 45 years. The age distribution did not differ between sexes.

Females were better educated. Only 18% of them had primary education, but 30% held tertiary education. For males these percentages were reversed. Workers experienced several unemployment spells, but around 60% of them had only one complete unemployment spell. Almost 99% of the individuals had up to 5 unemployment spells. These shares did not differ considerably between sexes.

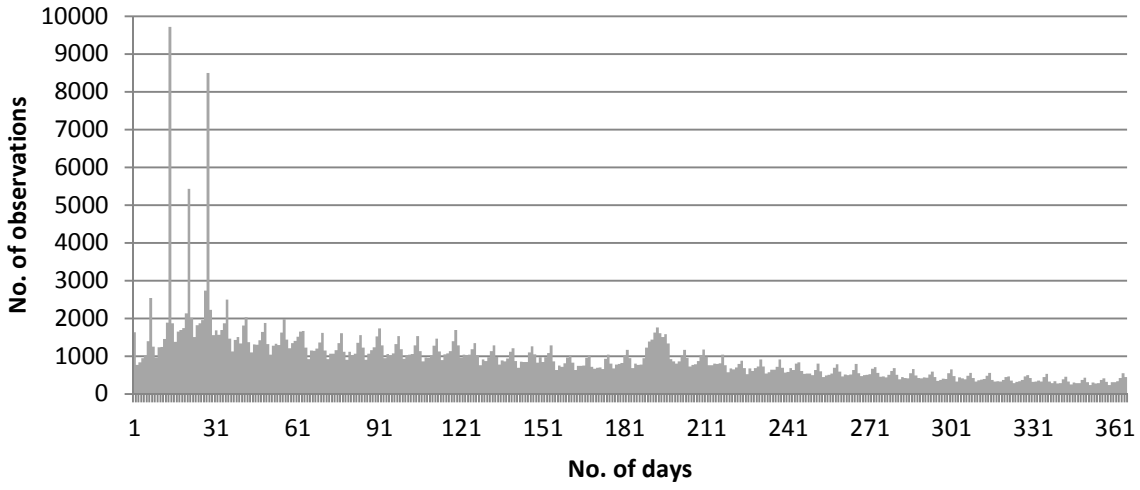
Table 1. Distribution of the unemployment duration of the complete unemployment spells (in days)

	mean unemployment duration	25%	50%	75%
all spells	228	53	144	287
1st spell	239	58	154	300
2nd spell	221	49	137	279
3rd spell	210	46	131	267
4th spell	199	41	125	259
5th spell	186	57	121	243

Source: own elaboration.

The mean unemployment duration for all spells equalled 228 days (7.5 months). Table 1 presents the mean unemployment duration for the 1st, 2nd, 3rd, 4th, 5th unemployment spell and for all unemployment spells altogether. It also includes the 25th, 50th and 75th percentile to indicate the distribution of the spells' length. Each consecutive spell was shorter, but they shortened at a decreasing rate. Around 47% of workers experienced each subsequent spell shorter than the previous one (for 1 to 5 spells). The mean unemployment duration was longer for females than males.

Figure 1. The length of the first completed unemployment spell (in days)



Source: own elaboration.

Figure 1 presents the distribution of the length of the first complete unemployment spell. To increase the readability of the figure, the maximum length of the unemployment spell was set at the level of 365 days, what covered 80% of the sample. The overall shape of the distribution resembled log-logistic distribution. The peaks were visible around 1st, 2nd, 3rd and 4th week of the spell duration, and after three and six months what could be connected to unemployment benefit payments. The peak after six months of the unemployment spell was more easily distinguishable for females than males. Additionally it appeared only for the first unemployment spell.

3. Survival analysis

I employed semi-parametric methods of the survival analysis to identify the impact of age, sex and education level on the hazard of leaving the unemployment pool. I accounted for deregistration from the unemployment pool, regardless of the direction of the outflow. Thus, a worker could have e.g. found a job or moved to inactivity. I analysed multiple unemployment spells and compared the results with those for the 1st, 2nd, 3rd, 4th and 5th unemployment spell to check whether the impact of certain variables differed.

Multiple spells arise when two or more events happen to the same object, for example we observe two consecutive unemployment spells "interrupted" by the employment spell. The multiple spells analysis was developed by Lancaster (1979) and Heckman and Singer (1982), while Van den Berg (2001) provided a literature review of types of multiple-duration models that find application to unemployment. I estimated a Prentice at el. (1981) conditional risk set model. I chose the model of a stratified proportional hazard type in which time to each event is counted from entry. I estimated models separately for males and females. The Cox model, for consecutive unemployment spells, included sex variable directly in the specification. Table 2 compiles the results.

Table 2. Conditional risk set model and Cox model estimates for unemployment spells

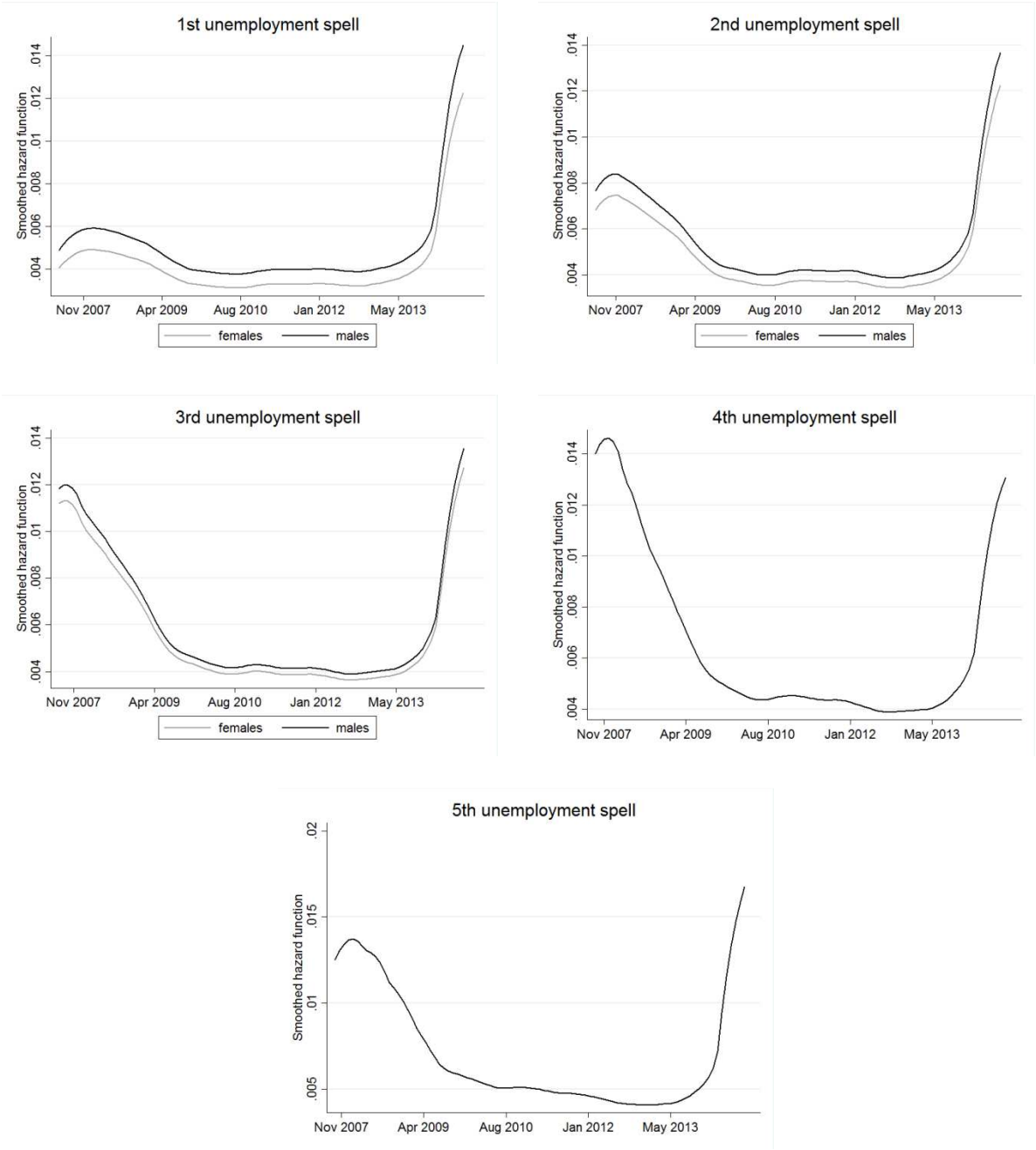
variable/statistics	all spells females	all spells males	1st spell	2nd spell	3rd spell	4th spell	5th spell
sex:							
males	-	-	-	-	-	-	-
females	-	-	-0.1883*** [0.003]	-0.1180*** [0.005]	-0.0686*** [0.008]	-0.0019 [0.012]-	-0.0236 [0.017]
age	-0.0500*** [0.001]	-0.0332*** [0.001]	-0.0284*** [0.001]	-0.0231*** [0.002]	-0.0323*** [0.002]	-0.0406*** [0.004]	-0.0410*** [0.006]
age^2	0.0005*** [0.000]	0.0002*** [0.000]	0.0001*** [0.000]	0.0001*** [0.000]	0.0002*** [0.000]	0.0004*** [0.000]	0.0004*** [0.000]
education:							
primary	-	-	-	-	-	-	-
vocational	-0.0228*** [0.007]	-0.0177*** [0.005]	-0.0624*** [0.005]	-0.0444*** [0.007]	-0.0211** [0.011]	-0.0302** [0.015]	-0.0088 [0.022]
secondary general	-0.1062*** [0.007]	-0.0790*** [0.006]	-0.1032*** [0.005]	-0.0933*** [0.009]	-0.0443*** [0.013]	-0.0361* [0.020]	-0.0030 [0.030]
secondary vocational	-0.0867*** [0.007]	-0.0671*** [0.005]	-0.1019*** [0.005]	-0.0590*** [0.007]	-0.0126 [0.011]	-0.0184 [0.017]	0.0190 [0.025]
post-secondary education	-0.1135*** [0.008]	-0.1244*** [0.011]	-0.1305*** [0.008]	-0.1138*** [0.012]	-0.0800*** [0.018]	-0.0642** [0.028]	0.0311 [0.043]
tertiary	-0.0131** [0.006]	-0.0415*** [0.006]	-0.0170*** [0.005]	0.0138* [0.008]	0.0560*** [0.012]	0.0790*** [0.019]	0.2094*** [0.029]
Wald χ^2	7259	13474	24352	6102	1790	712	306
p-value	0.00	0.00	0.00	0.00	0.00	0.00	0.00
No. of subjects	210488	223379	433867	172727	71541	32106	15033
No. of failures	341651	398039					

Notes: Sample includes individuals aged 18-65, age is the age at the beginning date of a certain spell. Data for the period 2007-2014. * - significant at the 10 per cent level, ** - significant at the 5 per cent level, *** - significant at the 1 per cent level.

Source: own elaboration.

Females experienced 1.6 unemployment spells per individual, while males almost 1.8 per individual. Conditional risk set model for males and females produced qualitatively similar results compared to those for consecutive spells. Younger workers with primary education experienced the highest hazard of leaving the unemployment pool. Cox estimates indicated that females had lower hazard of exiting the pool, but the difference between sexes vanished in 4th and 5th spells. All specifications proved non-linear impact of the age. Increase in age decreased the hazard at an increasing rate. Only tertiary education, compared to primary one, increased chances of leaving the unemployment pool. The positive impact was visible since 2nd spell (by 1.3% in the second spell, and up to 23% in the fifth spell). The difference between other educational levels diminished in subsequent spells.

Figure 2. Smoothed hazard function for 1st, 2nd, 3rd 4th and 5th unemployment spells



Source: own elaboration.

Figure 2 compiles the smoothed hazard functions of leaving the unemployment pool in consecutive spells. In all cases the hazard at first increased and then decreased at a decreasing rate. The most favourable conditions were between 2007 and 2009, what corresponds to the business cycle in Poland.

4. Discussion and conclusions

Preliminary results of the complete spells in registered unemployment in Poland provided some interesting conclusions. The unemployment spells differed in length and each consecutive one was on average shorter than previous ones. But, slightly less workers experienced shorter subsequent spells. Thus, they either learned how to seek job or left the pool. Estimates indicated that younger males with primary education were better off at leaving the pool, but the impact of sex and education diminished in subsequent spells. Tertiary education increased the hazard of exiting the pool from 2nd spell. The highest hazard of leaving the pool experienced by those with either primary of tertiary education proved heterogeneity among job seekers and the mismatch between job seekers and job vacancies (as public employment offices usually have low quality job offers).

Initial analysis proved some limitations of the results. In the future research, I plan to account for competing risks and look at transitions from unemployment to employment or inactivity. I aim at including more covariates to identify the impact of certain variables on studied transitions. I also want to verify whether interactions between certain variables occur. I want to compare the results with estimates of the Prentice at el. (1981) conditional risk set model in which time to each event is counted from the time of the previous event. Finally, I want to employ parametric survival analysis techniques.

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