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HOW DO UNEMPLOYED WORKERS BEHAVE PRIOR TO RETIREMENT? A MULTI-STATE MULTIPLE-SPELL APPROACH

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Abstract

We examine the behaviour of unemployed older workers up to five years prior to the point at which they can transition out of unemployment because they become eligible to receive pension benefits. We use a unique dataset covering the unemployment histories (longitudinal data) of individuals born between 1940 and 1965 who were registered with any of the public employment offices in Poland. Thus, we study a whole population of individuals who experienced this type of transition over the time period 1996-2015. We examine the transition from unemployment to retirement as a multi-year process. We analyse multiple unemployment spells, identify transition pathways, and look for patterns in these transitions. Moreover, we estimate a conditional risk set model (a stratified Cox model). Our research proves that being close to the point at which they are eligible to receive pension benefits leads individuals 'wait' to fulfil these eligibility criteria.

JEL Classification: C14, C41, H55, J14, J22, J26, J64

Keywords: elder workers unemployment, retirement, transition pathways, multiple unemployment spells, recurrent event data, longitudinal analysis

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1.   Introduction

We examine the behaviour of unemployed older workers up to five years prior to the point at which they become eligible[1] to receive pension benefits; i.e., prior to transitioning from unemployment to retirement. We argue that being close to the point at which they are eligible to receive pension benefits leads individuals 'wait' to fulfil these eligibility criteria. If this is the case, workers, who are 'waiting' for pension benefits are not fully contributing to the effective labour supply. They may be expected to experience long unemployment spells[2], and a low hazard of transitioning from unemployment to employment. The five-year period has been chosen arbitrarily, but we argue that this time horizon is short enough for individuals to look forward to receiving pension benefits, and long enough for individuals to still seek to actively participate in the labour market.

We use a unique dataset that contains a whole specified population. It is comprised of the registered unemployment histories (longitudinal data) of individuals born between 1940 and 1966 who were ever registered with any of the public employment offices in Poland. From this population of ever-registered workers, we have chosen individuals who retired directly from unemployment, and observe them over the five-year period prior to this retirement transition. We focus on complete unemployment spells and transitions out of unemployment. The five-year period is somewhat conventional. For each individual, we set the five-year point prior to her daily date of retirement, and seek to identify for the period following this date the individual's first complete unemployment spell, and any subsequent unemployment spells, up to retirement. Thus, we actually observe individuals for up to five years.

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[1] Legally, an individual cannot be registered as unemployed if she is eligible to receive pension benefits. Throughout the paper, we assume that those who became eligible to receive pension benefits actually retired, and we use the expressions 'became eligible to receive pension benefits' and 'transitioned from unemployment to retirement' interchangeably.
[2] We define a spell as the period of time between registration and deregistration.

Our focus is on Poland over the 1996-2015 period. We have daily duration data, which include information on individual characteristics such as age, sex, education, and labour market history. Thus, the data provide information on the type of registration (as an unemployed worker or as a job seeker[3]), and the reason for the deregistration. We can directly account for competing risks and multiple unemployment spells. The whole dataset covers the 1990-2016 (August) period. We shortened this time span, and studied the 1996-2015 period. In the years immediately following Poland's transition from a socialist to a market economy, the labour market administration was still adjusting to new challenges. Because the data collected during those years may be inaccurate and of poor quality, we removed data for the 1990-1995 period (i.e., the period until Poland became an OECD member) from our sample. We also did not use the available data for a portion of 2016 in order to avoid bias related to the uncontrolled seasonality of registration. In sum, we use a multi-state, multiple-spell approach over the 20-year period of 1996-2015.

While we have found no similar analyses based on longitudinal data in the literature, we have encountered a few papers that outline the scope of the previous research on this topic. We analyse retirement as a process[4], not as a simple transition from labour force to inactivity. An individual anticipates[5] the future and prepares for retirement. From an economic perspective, a worker discounts time, and adjusts to the effects of an action that is expected to happen in the near future. Workers are subject to various (dis)incentives to retire sooner or later.

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[3] A job seeker is a person who does not fulfil the unemployment criteria, but uses the public employment office for help in finding a job.

[4] Compare Wang and Shultz (2010) on psychological conceptualisations of retirement as a process.

[5] For example, Desmette and Gaillard (2008) proved that once a person has categorised herself as an older worker, she has a stronger desire to retire early. Ekerdt et al. (2000), in turn, examined the tendency to anticipate retirement, and noted that individuals tend to talk and think about retirement more frequently as they approach retirement age.

Most of the previous research on retirement has focused on retiring from employment (compare, for example, Gruber and Wise 1999 and 2004). Hairault et al. (2010) studied distance to retirement. They found that this distance in interaction with the generosity of unemployment benefits and the low demand for older workers explained the low employment rate prior to reaching the eligibility age. Coile and Gruber (2007), applied forward-looking models, and argued that pension benefit policies that increase incentives to work at older ages could significantly reduce the labour force exit rate of older workers. Myck et al. (2014) examined the relationship between the retirement decision and health status in Poland. They found that while health status was positively related to labour force participation, it did not significantly affect the timing of the outflow to inactivity.

Retiring from unemployment has received less attention in the literature, even though this exit route from the labour force is becoming increasingly important (Garcia-Perez et al. 2013). Our aim is to fill this gap in the literature. Hutchens (1988) found that job opportunities decline with age, and that the lack of opportunities could increase the risk of entering retirement. However, Benitez-Silva and Ni (2010) showed that job search behaviour was strongly correlated with labour market outcomes, and that seekers were more likely to find a (new) job. Rutledge (2014) analysed the duration of the job search efforts of older workers. The results indicated that job-seeking efforts declined quickly among unemployed older workers, and that the availability of financial resources shortened this period further; whereas the labour market conditions had little impact. Gałecka-Burdziak and Góra (2016) investigated whether the availability of pension benefits discouraged older workers from looking for a job. They argued that if pension benefits are perceived as the only potential income, having access to such benefits should increase considerably the probability that individuals will transition from unemployment to inactivity. Gałecka-Burdziak and Góra (2016) found that if an old-age benefit became the worker's main source of income, she was

eight to 20 times more likely to exit the market after one year than recipients of unemployment or social welfare benefits.

Marmora and Ritter (2015) studied the process of retiring directly from unemployment. They examined how an unemployment spell at a late stage of a worker's career affected her retirement timing, and found that an unemployed worker was significantly more likely than an employed worker to leave the labour force permanently. This effect was stronger for workers who became eligible for pension benefits, but was weaker for workers who were eligible for unemployment benefits.

Garcia-Perez et al. (2013), in turn, analysed the impact of public regulations on the labour market decisions of workers close to retirement. They distinguished between transitions to retirement from employment and from unemployment, and found that unemployment regulations significantly affected the timing of retirement. Moreover, they found that unemployment benefits constituted an attractive income source[6] for those who were eligible to receive such benefits prior to retirement.

In our study, we employ recurrent event data (multiple spells) models. These methods are widely used in medicine, but are used less often in labour economics. Akerlof and Main (1980) examined the impact of multiple unemployment spells on mean unemployment duration. They found a negative correlation between the average length of a spell and the number of unemployment spells experienced in a calendar year, and argued that the length of complete spells understated the true unemployment experience. Heckman and Borjas (1980) followed 122 men (who fulfilled additional criteria) over a 30-month period after they completed high school, and tested for the presence of duration dependence, occurrence dependence, and lagged duration dependence in multiple unemployment spells.

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[6] In a few countries, significant shares of workers collect unemployment benefits prior to retirement. The shares vary from 7% in Sweden to 40% in Japan (Coile and Levine 2006).

Trivedi and Alexander (1989) employed an extended version of the mixed-proportional-hazards model, and estimated the Prentice et al. (1981) model. They directly accounted for repeated unemployment spells, and examined the determinants of the conditional probability of reemployment among long-term unemployed young people. The sample of complete spells consisted of 521 observations for one spell, 180 observations for two spells, and 64 observations for three spells. Trivedi and Alexander (1989) concluded that fitting a common duration model to data from different spells involved a major misspecification[7].

With this study, we contribute to the literature in several ways. Unlike previous studies, we examine the transition from unemployment to retirement as a multi-year process. Thus, we add to the literature on the retirement process. Moreover, to our knowledge, no previous study has examined the labour market behaviour of unemployed individuals during a period of several years (in our case, five years) prior to their transition to retirement. We argue that this time span is short enough to allow the individual to look forward to receiving old-age benefits, and to form tangible expectations regarding pension benefits. Yet at the same time, this period is long enough for an individual to still have incentives to participate in the labour market. For example, if an older worker who becomes unemployed looks for a job and transitions to employment, she can expect to receive more generous pension benefits when she retires. In addition, we identify multiple unemployment spells, and examine the transition pathways to retirement of the individuals who experience these multiple spells. We look for patterns in these transition pathways. Next, we estimate the conditional risk set model (Prentice et al. 1981) in both versions: i.e., the time from entry and the time from the previous

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[7] Hamerle (1988) also studied theoretical models for multiple-spell duration data. He examined the duration of unemployment (7660 spells, 5848 of which were first spells and 1812 of which were second spells) in Bavaria, and also found that reducing the analysis of multiple-spell data to the analysis of single-spell models led to false interpretations and conclusions. Moreover, the types of multiple-duration models that apply to unemployment in particular were surveyed and described in Van den Berg (2001).

event (stratified Cox model for multiple spells). This model has seldom been applied in unemployment analysis.

We find that almost 75% of the workers spent at least 50% of the observation time in the registry. The unemployment spell that directly preceded the transition to retirement was longer than the mean spell duration, and it was longest among those who experienced only one unemployment spell. The lengths of the periods during which the workers collected unemployment benefits suggested that the workers perceived the benefits as a valuable source of income, and as a means of continuing to contribute to the acquisition of pension rights. The conditional risk set model estimates in both specifications, the PWP-TT and the PWP-GT, confirmed that men, older workers (at an increasing rate), and non-claimants of unemployment benefits were more likely to leave the unemployment pool. Education did not affect the hazard rate of leaving the pool. As our results are based on a very large dataset, we can strongly assert that unemployed individuals who are close to the point of being able to collect pension benefits have a tendency to 'wait' to fulfil pension benefit eligibility criteria, and thus to transition from unemployment to inactivity.

2. The data

We used a unique dataset that covers the whole specified population. The entire dataset contains the registered unemployment histories (longitudinal data) of all individuals born between 1940 and 1966 who were ever registered with any of the public employment offices in Poland. The dataset refers to more than 900,000 individuals for whom we observed almost 12,000,000 actions. While the dataset covers the 1990-2016 (August) period, we shortened this time span for our analysis, and studied the years 1996-2015. During this period, the legal conditions changed a number of times. A brief description of the changes in the social security system can be found in Kula and Ruzik-Sierdzińska (2001), and an outline of

the changes in the labour market found in a set of reports in *Employment in Poland* (various issues).

From the whole dataset, we extracted individuals who retired directly from unemployment; i.e., they deregistered as unemployed when they became eligible to receive pension benefits. While these individuals were permitted to register as job seekers after this point, we did not follow what happened to them after retiring. For each individual, we determined the date five years prior to the person's transition from unemployment to retirement, and looked for her first registration after that date. We examined all of the spells the individual experienced from this registration until retirement. Thus, the five-year observation period was somewhat conventional; and we actually observed each individual for up to five years prior to her retirement transition.

Our 'sample' covered the whole predetermined population. We observed all individuals born between 1940 and 1965 who met the following criteria: they were ever registered with any of the public employment offices in Poland, they became eligible to receive pension benefits during a registered unemployment spell, and they transitioned directly from unemployment to retirement. Hence, the representativeness of the sample is not an issue.

We focused on complete unemployment spells for which we had information on the exact daily dates of registration and deregistration. We knew whether a person registered as unemployed or as a job seeker, and the reason for deregistration (e.g., transition to employment, participation in ALMP programmes, or inactivity). We had daily duration data that provided us with information about the characteristics of each individual, including about her age, sex, education, and labour market policy actions. We could, for example, compute exactly how many days an individual collected unemployment benefits.

This sample was made up of 15,549 individuals who experienced 31,886 complete spells (as unemployed workers or job seekers). While the individuals in the sample experienced up to 19 spells[8], 99% had up to seven spells. Due to the number of observations, we restricted our analysis to five complete spells[9], which covered almost 97% of the sample. Hence, the final sample was made up of 15,040 individuals who experienced 28,399 complete spells (27,902 complete unemployment spells, 495 complete spells as job seekers, and two spells in which an individual was registered as eligible to receive pre-retirement benefits and remained in the pool until she became eligible to receive pension benefits). Table 1 displays the distribution of the number of observations for a given number of spells (up to five spells) and the number of individuals who experienced a given number of spells.

Table 1. Distribution of the number of complete spells from 1 to 5 spells (out of a total of 19 spells)

No. of spells	No. of observations of a given number of spells			No. of individuals who experienced exactly a given no. of spells		
	No. of observations	Percent	Cumulated %	No. of observations	Percent	Cumulated %
1	15549	48.76%	48.76%	7455	47.95%	47.95%
2	8094	25.38%	74.15%	4033	25.94%	73.89%
3	4061	12.74%	86.88%	1936	12.45%	86.34%
4	2125	6.66%	93.55%	1010	6.50%	92.84%
5	1115	3.50%	97.05%	606	3.90%	96.73%

Source: own elaboration.

The mean duration of an unemployment spell was 12.9 months (13.5 months for women and 12.2 months for men). The subsequent unemployment spells were shorter. Moreover, the consecutive unemployment spells were shorter for individuals who experienced further periods of unemployment than for those for whom the given spell was the last one. The individuals who experienced only one unemployment spell waited an average of 21.7 months to become eligible to receive pension benefits. However, among all unemployed

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[8] Some individuals had many complete spells, as they frequently transitioned to seasonal employment.
[9] In the quantitative part of the research, we estimated a conditional risk set model (PWP); and found that if a risk set is relatively small for higher ranked events, the estimates can be unstable and imprecise (Box-Steffensmeier and Zorn 2002).

individuals, the last spell lasted an average of 16.8 months. In Figure 1 in the appendix we compiled the Kaplan-Meier survivor function estimates for those who experienced only one unemployment spell, and for the whole sample based on the last unemployment spell. In both cases, the unemployment spell terminated in a transition from unemployment to retirement, but those who experienced more preceding spells were more likely to transition out of the labour force at an earlier date. The mean duration of a job seeker spell was 5.2 months, and almost 76% of job seeker spells were shorter than this mean.

Table 2. Mean duration of certain unemployment spells

	Mean duration of spells (in months)	
	Total	When a given (ordinal) number of a spell was the last spell a person experienced[a]
Total	12.9	-
1st	15.9	21.7
2nd	10.8	14.0
3rd	8.7	11.1
4th	7.4	8.8
5th	7.2	7.2

[a] – e.g., 2nd spell for those who experienced two spells only
Source: own elaboration.

We observed individuals for up to five years (i.e., from the beginning of the first complete spell until the individual had transitioned from unemployment to retirement). On average,[10] we observed the individuals for around 32.3 months (around 2.7 years). Among the individuals who had experienced at least two unemployment spells, 50% spent from 50% to 80% of the total observation time in the unemployment registry; and only 27% spent less than 50% of the total observation time in the unemployment registry.

Women made up 60% of the sample, and they were, on average, better educated than the men. More than five out of six of the men and two out of three of the women had primary or vocational education. More women (27%) than men (10%) had secondary general or secondary vocational education. While we observed individuals born between 1940 and 1965, more than 90% of them were born between 1944 and 1955. In general, the women were

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[10] Around 25% of the individuals were observed for up to 15 months, 50% were observed for up to 34 months, and 75% were observed for up to 48 months.

younger than the men. On average, men became eligible to receive pension benefits at age 58.3, while women became eligible to receive pension benefits at age 54.9[11].

Table 3. Duration of collecting the unemployment benefit

Frequency and number of days of collecting unemployment benefits					
Duration (no. of days)	All spells in which unemployment benefits were collected	Spells that terminated when a person became eligible to receive pension benefits	Duration (no. of days)	Spells in which the spell and the collection of unemployment benefits terminated on the same day	Spells in which the spell and the collection of unemployment benefits terminated on the same day, and in which a spell terminated because a person became eligible to receive pension benefits
-	-	-	Just before 6 months (170-175)	3.76%	2.81%
6 months (181-184)	5.62%	5.64%	-	-	-
9 months (275-276)	1.59%	1.74%	-	-	-
-	-	-	Just before 12 months (355-366)	5.25%	4.85%
12 months (365-367)	31.82%	30.88%	-	-	-
18 months (546-550)	2.75%	2.50%	-	-	-
No. of observations	13500	8611		7101	4845

Notes: To make the table more readable, we highlighted frequent durations in short time spans (peaks), and omitted the other durations; thus, the percentages do not sum to one.
Source: own elaboration.

Unemployment benefits were collected in almost 48% of the total observed spells, but were collected in 57% of the spells that ended with a transition from unemployment to retirement. More than 35% of the individuals in the sample never collected unemployment benefits, while almost 19% collected unemployment benefits more than once. In Table 3, we display information on the lengths of time the unemployment benefits were collected. We distinguished between spells in which unemployment benefits were collected until the spell terminated, and spells that terminated with a transition from unemployment to retirement. In 53% of all spells, the length of the spell was the same as the number of days the individual

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[11] In the period covered by our analysis, the standard age at which workers became eligible to receive pension benefits was 60 for women and 65 for men. However, until the beginning of 2009, workers had access to a range of early retirement schemes. Since 2009, the actual retirement age has increased, but still remains below the standard retirement age.

was collecting unemployment benefits. We can thus assume that the unemployment spell and the collection of unemployment benefits terminated on the same day.

The data indicated that most of the individuals collected unemployment benefits for the maximum eligibility period, and that in around 30% of the cases the unemployment benefits were collected for a year. The other peaks were visible at around six months, and to a lesser extent at around 18 months and at around nine months. In general, the spells in which unemployment benefits were collected until the termination of the spell were slightly shorter. The temporal distribution of the periods of collecting unemployment benefits was more uniform, although small peaks were visible shortly before the end of the eligibility period, such as at six months or 12 months. During the spells that terminated with the transition from unemployment to retirement, it appears that individuals collected benefits for the maximum eligible period needed to acquire pension rights.

3.   Transition pathways

We used a unique and very rich dataset that allowed us to analyse in detail the transition pathways of the registered workers. The results were exact numbers, and not estimates. They produced a very reliable picture of the transitions and the dynamics in the labour market. We focused on workers who retired directly from being registered with the public employment office. Out of the 15,040 individuals we observed, 15,035 had transitioned to retirement from unemployment, three had been registered as a job seeker when they transitioned to retirement, and two had been collecting pre-retirement benefits[12] when they transitioned to retirement. In general, we did not observe pre-retirement benefit claimants because they did not acquire pension rights before 2004, when, due to legal changes, their cases were moved to the social security office. Moreover, pre-retirement benefit claimants

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[12] In the sample, there were 53 individuals who collected pre-retirement benefits, but only two of them registered as pre-retirement benefit claimants. The other 51 workers registered as unemployed and acquired the right to pre-retirement benefits during their unemployment spell. They also 'waited' to become eligible to receive a pension, but we observed their transition to retirement from unemployment.

may by definition be expected to have been waiting to collect pension benefits, as they had guaranteed pension rights at some predetermined point in the future, and were not obliged to look for a job.

In Table 4 we display the frequency of each type of transition in the whole sample. Relatively few flows represented transitions from unemployment to employment (22%). Most of the registered workers simply retired (53%), participated in ALMP programmes, claimed social policy benefits (other than pension benefits), or became inactive (claimed no social benefits). Job seekers and their transitions remained at the very margin of the picture. The number of registrations was greater than the number of deregistrations in 1996-2005 and in 2009-2011. Transitions to employment reflected business cycle changes, whereas other types of outflows (especially to retirement or to ALMP participation) reflected changes in the labour market or in pension policies. The highest single values of outflows from unemployment to retirement occurred in 2008 and in 2013.

Table 4. Types of transitions out from registry

From	To	No. of observations	%
Unemployment	pension benefits	15035	52.94%
Unemployment	employment	6233	21.95%
Unemployment	ALMP	3696	13.01%
Unemployment	inactivity	2054	7.23%
Unemployment	other reasons	884	3.12%
Job seekers / pre-retirement benefits claimants	all reasons	497	1.75%

Notes: pension benefits – acquisition of rights to pension benefits, employment – employment, self-employment, seasonal employment, ALMP – public works, intervention works, subsidised employment, trainings, inactivity – not ready to start working, refusal of help from public employment office services, no renewal of willingness to work, other reasons – other legally permitted reasons included collecting invalidity allowance, self-deregistration, collecting social welfare benefits, and arrest.
Source: own elaboration.

Table 5. Frequency of transitions to employment, ALMP participation, or inactivity (at least once) in particular transition pathways before workers retired (in the whole sample)

Type	Frequency of transitions			
	2-spell pathways	3-spell pathways	4-spell pathways	5-spell pathways
Employment at least once	49.00%	61.98%	65.45%	73.43%
ALMP at least once	18.57%	37.71%	50.10%	46.04%
Inactivity at least once	20.18%	25.00%	22.38%	20.63%
No. of subjects	4033	1936	1010	606

Source: own elaboration.

We disaggregated the transition pathways by the number of spells the individuals experienced, and in Table 5 we included the frequency of at least one transition from registry to employment, ALMP participation, or inactivity in particular transition pathways. In Figures 2 to 5 in the appendix we compiled the most popular transition pathways for the two-spell, the three-spell, the four-spell, and the five-spell registered histories of individuals. In each type of pathway, relatively few workers transitioned to employment even once, whereas a large number of workers circulated from unemployment to ALMP participation only, or predominantly.

4.   Multiple-spell approach

In our analysis, we applied recurrent event data models (multiple failure data, multiple event data). Data of this kind violate the assumption that the failure times are independent, as they are correlated within clusters. There are ordered event models (in which events occur one after the other) and unordered event models (in which events can occur in any sequence) (Cleves 2000). The ordered event models include a counting process approach by Andersen and Gill (1982), a marginal risk set model by Wei et al. (1989), and an conditional risk set model[13] (PWP) by Prentice et al. (1981).

We chose to use a conditional risk set model[14], because it is the only model in which a subject is at risk of experiencing a subsequent event only if she has experienced a previous event. The "risk set" at time t for the kth occurrence of an event is limited to the observations under study at time t of individuals who have already experienced k-1 events. The estimates are stratified by event order. Different events have different baseline hazards, but the covariate effects are constant across the strata. There are two versions of the conditional risk

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[13] Descriptions of these comparative models can, for example, be found in Box-Steffensmeier and Zorn (2002) or in Kelly and Lim (2000).
[14] The conditional risk set model is often preferred compared to other models for recurrent event data (Box-Steffensmeier and Zorn 2002; Wei and Glidden 1997).

set model: total time (elapsed time, time from entry) or gap time (inter-event time, time from previous event) (Box-Steffensmeier and Zorn 2002). In the total time specification, the time to each event is measured from entry; whereas in the gap time specification, the clock is reset to zero after each failure, and the time to each event is measured from the time of the previous event. Each of these versions of the PWP model address slightly different research questions. The total time model has a 'carry-over' effect, as the total time of the following risk interval includes the preceding intervals, and so on. Hence, a total time model that estimates a large treatment effect for the first event will carry it over for subsequent events. As a result, the elapsed times are usually correlated even if the gap times are not (Box-Steffensmeier and Zorn 2002). The total time model is generally used to analyse the impact of covariates on the *k*th event from the beginning of a study, while the gap time model is used to analyse the impact of covariates on the *k*th event from the previous event; e.g., when there are infrequent events, and the interest lies in predicting the next event (Amorim and Cai 2015).

We estimated a conditional risk set model in both versions: the PWP-TT (total time, time from entry) and the PWP-GT (gap time, time from previous event). The properties of our dataset entailed using discontinuous risk intervals[15]. We also used a robust variance estimator[16]. As we unified the transitions out of unemployment, we did not account directly for the competing risk in the estimates. We focused on transitions out of unemployment. In both specifications, we examined the effects of sex, age, education, unemployment benefits, and previous unemployment duration on the hazard of leaving the unemployment pool. We also tested for non-linearity in age (quadratic age), and the interaction between sex and age. In both groups of models, we divided the sample into subsamples of individuals who had experienced from two to five spells, from three to five spells, two spells, three spells, four

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[15] Discontinuous risk intervals were, for example, studied in Guo at el. (2008), in Jiang et al. (2006), and in Sagara et al. (2014).

[16] Kelly and Lim (2000) argued that a robust variance estimator may not accurately handle a within-subject correlation, but Boher and Cook (2006) claimed that it handled heterogeneity well.

spells, and five spells. The PWP-TT estimates are presented in Table 6, and the PWP-GT estimates are presented in Table 7.

Table 6. Prentice et al. (1981) total time model estimates

	PWP-TT model					
	2-5 spells	3-5 spells	2 spells	3 spells	4 spells	5 spells
sex:						
men	-	-	-	-	-	-
women	-13.506***	-15.887***	-24.005***	-27.476**	-19.241	-9.540
	(4.080)	(6.068)	(8.063)	(11.089)	(13.043)	(12.299)
age	-0.086*	-0.063	-0.535***	-0.393***	-0.140	0.259*
	(0.050)	(0.069)	(0.076)	(0.096)	(0.126)	(0.155)
age^2	0.001	0.001	0.005***	0.004***	0.001	-0.002
	(0.000)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
sex·age						
women	0.495***	0.593***	0.866***	1.015**	0.708	0.389
	(0.151)	(0.224)	(0.298)	(0.409)	(0.480)	(0.453)
sex·age^2						
women	-0.005***	-0.006***	-0.008***	-0.009**	-0.006	-0.004
	(0.001)	(0.002)	(0.003)	(0.004)	(0.004)	(0.004)
education:						
primary	-	-	-	-	-	-
vocational	-0.003	-0.041*	0.044	-0.018	-0.058	-0.034
	(0.017)	(0.022)	(0.027)	(0.032)	(0.042)	(0.050)
secondary general	-0.013	-0.028	-0.006	-0.032	0.077	-0.059
	(0.033)	(0.042)	(0.053)	(0.060)	(0.079)	(0.107)
secondary vocational	-0.031	-0.062*	0.036	-0.028	-0.073	-0.073
	(0.023)	(0.035)	(0.035)	(0.052)	(0.059)	(0.085)
post-secondary	-0.051	-0.003	-0.006	0.088	-0.181	-0.225
	(0.059)	(0.080)	(0.081)	(0.117)	(0.212)	(0.193)
tertiary	-0.106*	-0.104	0.011	0.041	-0.229*	0.414*
	(0.064)	(0.100)	(0.089)	(0.143)	(0.133)	(0.212)
unemployment benefits						
no	-	-	-	-	-	-
yes	-0.460***	-0.529***	-0.218***	-0.433***	-0.569***	-0.397***
	(0.015)	(0.021)	(0.023)	(0.029)	(0.039)	(0.047)
cumulated duration of previous unemployment spells	-0.001***	-0.001***	-0.001***	-0.001***	-0.001***	-0.002***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Wald χ^2	1177.47	774.72	252.85	316.65	251.58	157.14
p-value	0.00	0.00	0.00	0.00	0.00	0.00
No. of subjects	7585	3552	4033	1936	1010	606
No. of failures	20944	12878	8066	5808	4040	3030

Notes: standard errors reported in parentheses, * - significant at the 10% level, ** - significant at the 5% level, *** - significant at the 1% level.
Source: own elaboration.

Table 7. Prentice et al. (1981) gap time model estimates

	PWP-GT model					
	2-5 spells	3-5 spells	2 spells	3 spells	4 spells	5 spells
sex:						
men	-	-	-	-	-	-
women	-5.543**	-5.712*	-16.793***	-10.748**	-15.090**	1.656
	(2.173)	(2.945)	(4.335)	(5.048)	(7.524)	(9.552)
age	-0.166***	-0.145***	-0.647***	-0.376***	-0.307***	-0.025
	(0.043)	(0.055)	(0.056)	(0.071)	(0.090)	(0.142)
age^2	0.002***	0.001***	0.006***	0.004***	0.003***	0.000
	(0.000)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
sex·age						
women	0.194**	0.207*	0.595***	0.386**	0.543**	-0.039
	(0.080)	(0.109)	(0.160)	(0.187)	(0.277)	(0.351)
sex·age^2						
women	-0.002**	-0.002*	-0.005***	-0.003**	-0.005*	0.000
	(0.001)	(0.001)	(0.001)	(0.002)	(0.003)	(0.003)
education:						
primary	-	-	-	-	-	-
vocational	0.037**	-0.001	0.107***	0.015	0.049	-0.055
	(0.016)	(0.019)	(0.025)	(0.026)	(0.031)	(0.035)
secondary general	0.006	-0.041	0.058	-0.042	0.005	0.044
	(0.028)	(0.038)	(0.043)	(0.052)	(0.061)	(0.058)
secondary vocational	0.004	-0.022	0.098***	0.026	-0.014	-0.030
	(0.021)	(0.028)	(0.031)	(0.038)	(0.046)	(0.064)
post-secondary	0.037	0.045	0.128	0.068	-0.010	-0.024
	(0.058)	(0.070)	(0.081)	(0.102)	(0.123)	(0.134)
tertiary	-0.084	-0.079	0.058	-0.073	0.036	0.029
	(0.066)	(0.108)	(0.080)	(0153)	(0.149)	(0.068)
unemployment benefits						
no	-	-	-	-	-	-
yes	-0.224***	-0.251***	0.095***	-0.127***	-0.260***	-0.090**
	(0.015)	(0.020)	(0.022)	(0.027)	(0.036)	(0.044)
cumulated duration of previous unemployment spells	0.000***	0.000***	0.001***	0.001***	0.000***	0.000***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Wald χ^2	406.36	266.16	652.98	287.66	186.82	59.64
p-value	0.00	0.00	0.00	0.00	0.00	0.00
No. of subjects	7582	3552	4030	1936	1010	606
No. of failures	20692	12632	8060	5766	3976	2890

Notes: standard errors reported in parentheses, * - significant at the 10% level, ** - significant at the 5% level, *** - significant at the 1% level.

Source: own elaboration.

Women were less likely than men to have left the unemployment pool. The impact of age was non-linear, and the arms of the parabola were directed upwards in all cases, except in the PWP-TT 5 spells sample, even though not all of the estimates were statistically significant. In many of the significant estimates, the abscissa of a vertex of a parabola was close to 50 years, which indicates that the hazard of leaving the unemployment pool was decreasing at a decreasing rate on the left of the abscissa. On the right of the vertex of the parabola, rising age increased the hazard of leaving the unemployment pool at an increasing

rate. Women experienced the effects of the changes in age on the hazard of leaving the unemployment pool differently than men. In the PWP-TT two-spell and three-spell samples, the arms of the parabola were pointed downwards, and the vertex of the parabola equalled 55-62 years. Our sample was situated close to the left of a vertex. In the PWP-GT 2-5-spell, the 3-5-spell, and the 4-spell samples, the arms of the parabola were also directed downwards. In the two-spell and the three-spell samples, the overall shape remained unchanged (like for men, the arms of the parabola were pointed upwards), but it became thicker and the vertex shifted to the left. Hence, the unitary changes in age led to smaller changes in the hazard of leaving the pool. The horizontal shift of the abscissa to the left meant that the sample was situated on the arm of a parabola that was pointed upwards, which indicated an increasing hazard at an increasing rate of leaving the pool. Education was found to be insignificant in most of the specifications, while the significant results did not show any clear pattern. The unemployment benefit estimates were significant, and in all cases except in the PWP-GT two-spell sample, the estimates indicated a decrease in the hazard of leaving the pool that was 10%-50% smaller than that of non-claimants. In the PWP-GT two-spell model, the claimants had a hazard of leaving the pool that was 10% higher. The cumulated duration of previous unemployment spells had a negative impact in the PWP-TT model, but a positive impact in the PWP-GT model.

5. Discussion

The length of the unemployment spells an individual experienced differed depending on the number of spells she experienced and whether the given ordinal number of spells was the last one in the registry history. The average length of the spell that directly preceded retirement was 16.8 months, but among the individuals who experienced only one spell, the average length was 21.7 months. It is likely that if these workers had been offered adequate incentives they would have increased their participation in the labour market. This seems

especially clear if we recall that the mean exit age from unemployment to retirement was well below the standard legal age. Among men, the mean exit age 58.3, compared to the standard retirement age of 65; while among women, the mean exit age was 54.9, compared to the standard retirement age of 60. Furthermore, the distribution of unemployment experiences revealed that individuals spent most of the observed time in the registry.

Collecting unemployment benefits discourages people from looking for a job, and lowers the hazard of leaving the unemployment pool. But unemployment benefits matter for individuals who are approaching retirement, as they represent an attractive source of income. Moreover, the length of the period during which the individual is collecting unemployment benefits is linked to the acquisition of pension rights, as the pension contributions paid on behalf of the unemployment benefit claimant increases her future pension benefits. More than 67% of the workers collected unemployment benefits at least once. Those who were not yet eligible to receive pension benefits collected the unemployment benefits for the longest entitlement periods – a trend that was especially visible through peaks around 12 months, six months, and 18 months. The individuals who needed some period of time during which they were collecting unemployment benefits in order to acquire pension benefits left the pool earlier, and the peaks were visible prior to the end of the entitlement periods.

Our observations of the pathways followed by older workers prior to retirement suggest that the transitions they experienced rarely led to employment, irrespective of the number of unemployment spells. Thus, the unemployed workers seldom returned to employment in the five years prior to retirement. These patterns may reflect individual preferences, but they may also be a result of the strong legal protections for older workers (four or fewer years below retirement age). Because older workers are hard to fire, employers may be reluctant to employ them. Moreover, the transition pathways indicated that the ALMPs offered to the older unemployed workers were largely ineffective. In many cases the

workers spent the period prior to retirement exclusively following the unemployment-ALMP pathway.

The estimates of the conditional risk set models were generally consistent. The results indicated that women were less likely than men to leave the unemployment pool, and that the impact of age was non-linear. It is important to keep in mind, however, that 95% of the individuals in the sample were at least 50 years old, and thus faced an increasing, at increasing rate, hazard of leaving the unemployment pool. The educational level was found to be insignificant, but we argue that some other variable that reflected the workers' job skills might have been more appropriate, as the knowledge acquired at school tends to become obsolete as workers age. The unemployment benefits claimants preferred to stay in the unemployment registry.

We used the cumulated duration of previous unemployment spells to account for lagged duration dependence. The estimates produced mixed results: the parameter sign was negative in the PWP-TT model, but was positive in the PWP-GT model. The PWP-TT and the PWP-GT models address slightly different research question. The total time model looks at the kth event from the beginning of a study. The gap time model looks at the kth event from the previous event. Hence, in a total time model negative estimates of lagged duration dependence could indicate that workers were less likely to exit the pool in subsequent spells (viewed from the beginning of an observation period). It is possible that the workers believed that they would transition to retirement eventually, and thus were waiting in subsequent unemployment spells for the final outflow from unemployment to retirement. They might have found it difficult to get another job due to the strong employment protections for workers close to retirement age. Moreover, they may have had no other incentives to leave the pool.

The gap time model focused on the duration of each unemployment spell, while neglecting intermediate non-unemployment spells. We would hypothesise that the

counterintuitive positive sign of the parameter estimate of the cumulated duration of previous unemployment spells indicates that the total time model was more appropriate given our study characteristics. Since we were analysing retirement as a process, the whole observation period mattered, including the individual's past unemployment experiences and intermediate non-unemployment spells.

We also think that the mixed results of the lagged duration dependence could be attributable to the structure of our sample. As we combined all of the reasons for deregistration, we treated outflows from unemployment to employment, inactivity, and retirement equally. Moreover, we constructed our database while keeping in mind that each transition pathway ended in retirement, even though the workers might have experienced varying numbers of intermediate spells. The reverse-numbering of spells might have affected the 2-5-spells and the 3-5-spells subsamples, but it should have not affected other subsamples.

Although our research provided interesting outcomes, we are aware that it was limited in several ways. First, we observed the registered histories of individuals who retired directly from having been registered with the public employment office. The analysis did not cover workers who entered retirement from any other state, even if they had also experienced an unemployment spell within five years prior to retirement. In particular, we did not observe those individuals who were unemployed five years prior to retirement, but who had found a job and eventually retired from employment. We examined the unemployment registry histories of 15,040 individuals who had acquired pension rights. In almost 95% of these cases, the individuals retired between 2001 and 2015. Between 2011 and 2014, an average of 1100 workers per year retired directly from registered unemployment. Yet according to data from the social security administration, an average of 121,000 workers per year became pensioners over the same period. Hence, we were examining an average of 0.9% of all new pensioners. This figure might seem small, but in our study we focused on individuals who experienced an

unemployment spell within five years prior to retirement, and were unsuccessful in finding a permanent job prior to retirement. It may be assumed that these workers decided to retire because pension benefits were their only potential source of income, and that they were discouraged from actively looking for a job. Our sparse observations of job seeker registration patterns among people above the standard retirement age (which we omitted in a quantitative analysis) could indicate that some retirees decided to unretire and search for a job. The LFS data for Poland indicated that in 2012, 50% of the individuals who were receiving pension benefits and were continuing to work did so primarily to ensure that they had sufficient personal/household income (LFS data for 2012, Eurostat). We argue that these transition pathways, although relatively small in absolute numbers, reflect the retirement processes of the least successful older workers in the labour market. We thus looked at a small, yet very important fraction of the retirement process.

Examining transition pathways provided us with valuable insights into the dynamics of the unemployment experience. These pathways included the direction of the outflows only. Thus, we accounted for competing risks. We intend to apply the duration analysis to the transition pathways, as well. As such an analysis will indicate not just the direction of the flows but the durability of particular states, it will provide us with additional knowledge of the dynamics of labour force attachment patterns. Moreover, the transition pathways could be developed to employ multi-state models[17] (MSM) to estimate the transition probabilities from one state to another.

Finally, we did not directly account for the unobserved heterogeneity in the estimates. This may have led to a bias in the shape of the duration dependence, in the impact of the regressors on the hazard rate, and in the parameter estimates. The literature indicates,

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[17] Compare Meira-Machado et al. (2009) for a survey on MSM models.

however, that when a fully flexible specification for the baseline hazard function is used, the size of the bias (a non-frailty model compared to a 'true' model) diminishes (Jenkins 2005).

The issue of unobserved heterogeneity has been tackled in a number of single-spell duration models, but it is generally omitted in multiple-spell analysis. Bijwaard (2014) surveyed multi-state models with unobserved heterogeneity, with an emphasis on semi-Markov models with a mixed proportional hazard structure. He argued that neglecting unobserved heterogeneity could affect the results, but noted that the modelling of unobserved heterogeneity using multi-state, multiple-spell models was still in its infancy. Unobserved heterogeneity has been also analysed by Van den Berg G. (2001) and Carrasco and Garcia Perez (2010), who used multiple-spell data to separately identify the effect of duration dependence and individual time-invariant unobserved heterogeneity. However, they applied random effects and fixed effects models.

In our analysis, we focused on multiple spells and assumed a flexible hazard. Moreover, the PWP model allowed the hazard function to vary between subsequent spells. We focused on the impact of covariates on the transitions out of unemployment along the transition pathways that ended in the transition from unemployment to retirement. We were not trying to identify the hazard function. The lagged duration dependence analysis by means of the cumulated length of previous unemployment spells was the only extension. The parameter estimates produced mixed results, which we interpreted cautiously, while keeping in mind that the PWP-TT and the PWP-GT address different research questions. Nevertheless, we plan to address the limitations of our analysis in future research.

6. Conclusions

In this study, we examined the behaviour of unemployed older workers up to five years prior to the point at which they transitioned from unemployment to retirement. We hypothesised that unemployed individuals who were close to retirement were not contributing

fully to the effective labour supply, and were 'waiting' to fulfil the eligibility criteria for retiring. We assumed that the five-year period was short enough to allow individuals to look forward to receiving pension benefits, and long enough that they still had incentives to actively participate in the labour market.

We used a unique dataset, from which we extracted a whole population of individuals who retired directly from unemployment between 1996 and 2015. We observed all of the workers born between 1940 and 1965 who had ever been registered with any of the public employment offices in Poland. The data contained the registered unemployment histories (longitudinal data) of individuals, and we focused on these individuals' multiple unemployment spells prior to their transition to retirement. We identified transition pathways, and applied a multi-state, multiple-spell approach. We restricted our sample to the individuals who experienced between one and five complete spells (97% of the whole population).

We found that almost 75% of the workers spent at least 50% of the observation period in the registry. The average length of the unemployment spell that directly preceded the transition to retirement was 16.8 months, and was 21.7 months for those who experienced only one spell. On average, women retired five years and men retired seven years before they reached the legal minimum retirement age. The length of the periods of collecting unemployment benefits suggested that workers perceived these benefits as an attractive source of income, and as a means to continue making contributions towards acquiring pension rights.

The conditional risk set model estimates, in both specifications, the PWP-TT and the PWP-GT, confirmed that men, older workers (at an increasing rate), and non-claimants of unemployment benefits were more likely to have left the unemployment pool. Education did not affect the likelihood of having left the pool. We interpreted the impact of the lagged duration dependence cautiously, and hypothesised that the cumulated duration of previous unemployment spells led workers to wait for retirement.

Our research approach yielded robust results that provide a solid basis for designing policy actions focused on older workers. Our results proved that being close to retirement age leads individuals to 'wait' until they can fulfil the pension benefit eligibility criteria to transition out of unemployment to inactivity. Our findings thus suggest that in Poland, unemployment spells in the period five years prior to retirement are in fact a kind of inactivity. Hence, policy actions should be aimed at creating more incentives for older workers to actively participate in the labour market and to contribute to the effective labour force.

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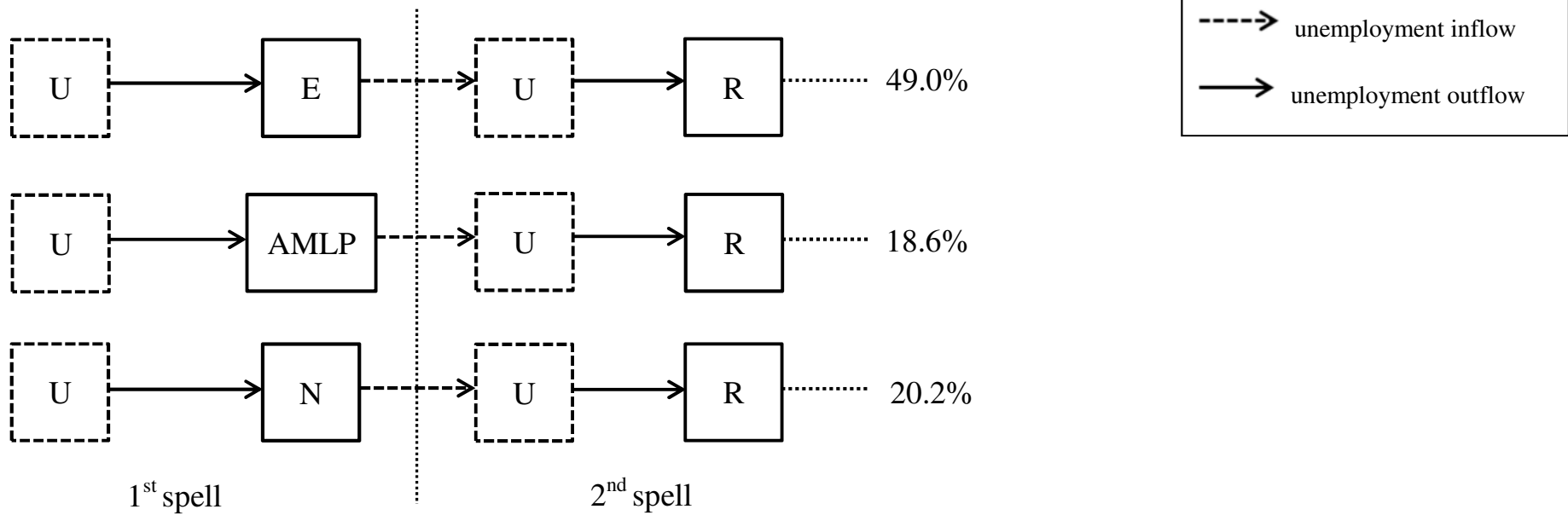
Appendix

Figure 1. Kaplan-Meier survival estimate for those who experienced only one unemployment spell, and for the last unemployment spell of the whole sample
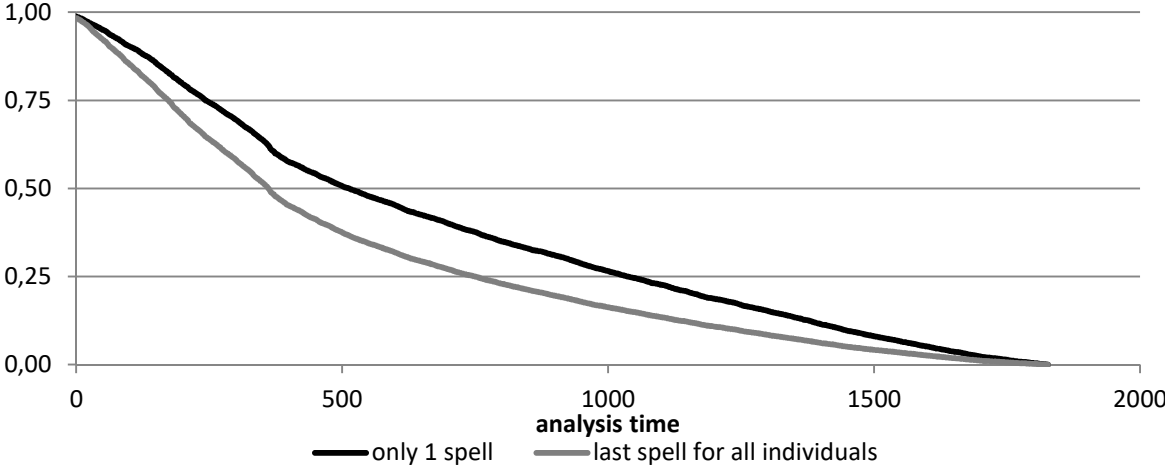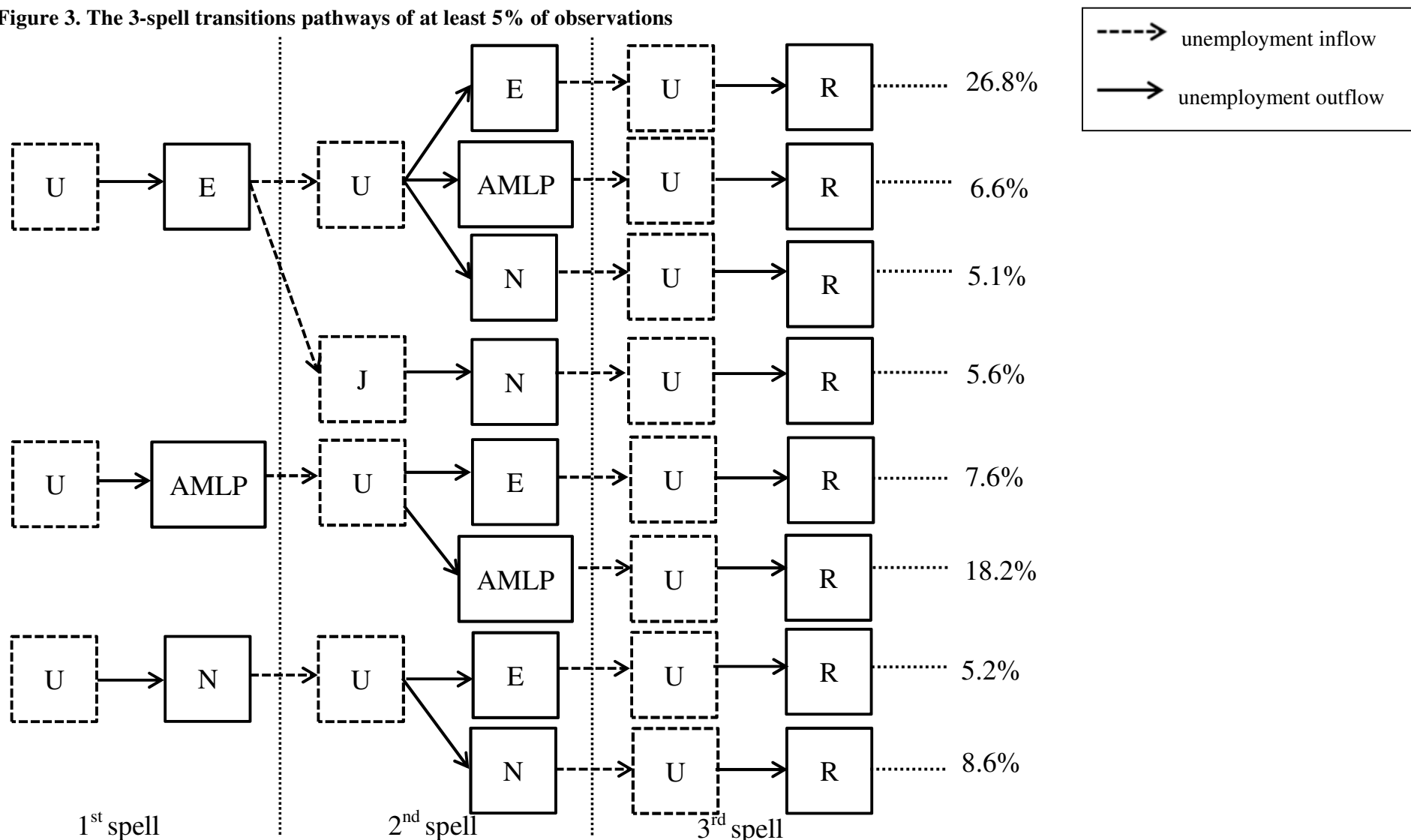

Source: own elaboration.

Figure 2. The 2-spell transitions pathways of at least 10% of observations

Notes: U – unemployment, E- employment, N – inactivity, ALMP – active labour market policy, R- retirement, other transitions comprise 12.2% of observations.
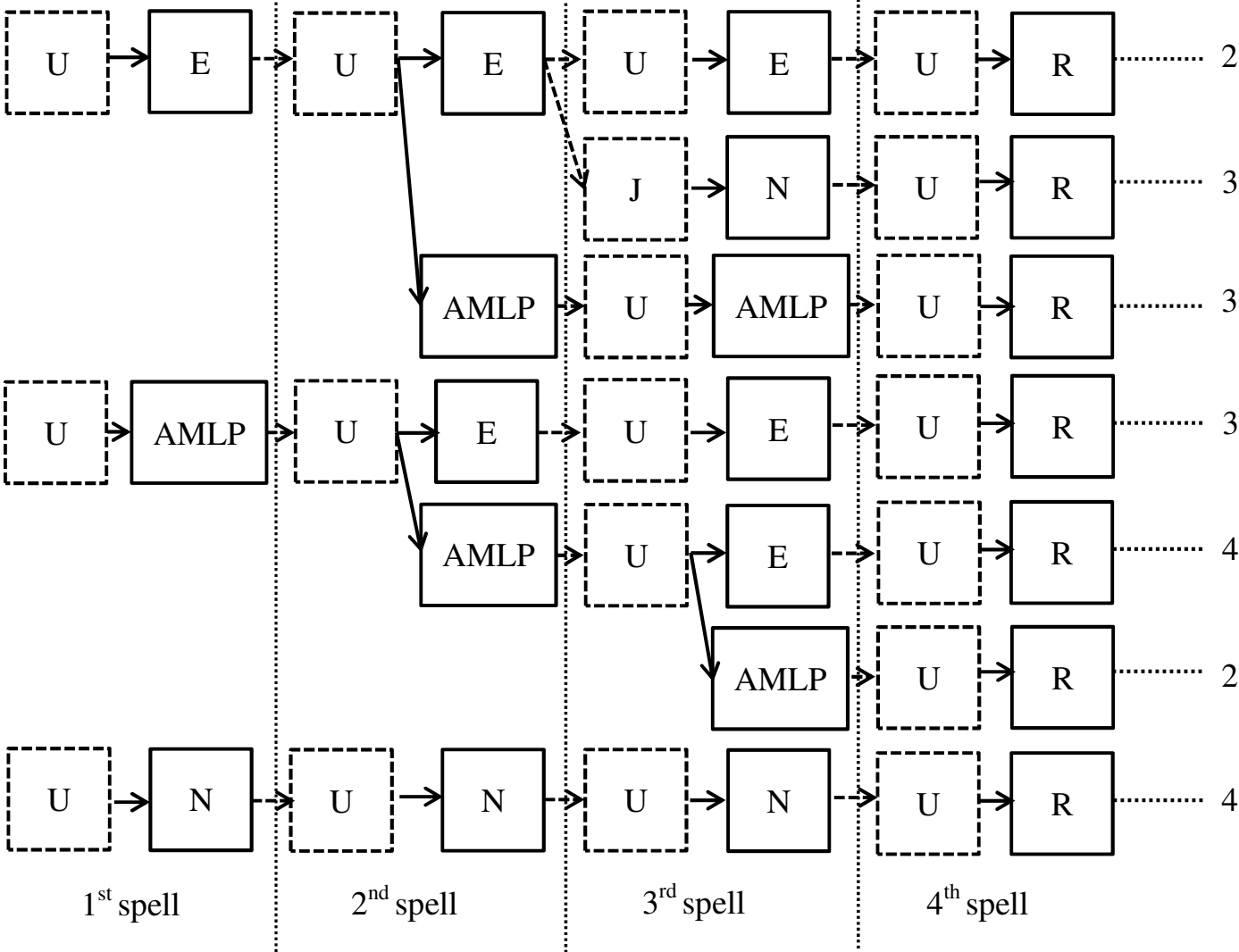**Source: own elaboration.**

Figure 3. The 3-spell transitions pathways of at least 5% of observations

Notes: U – unemployment, j – job seekers, E- employment, N – inactivity, ALMP – active labour market policy, R- retirement, other transitions comprise 16.3% of observations.
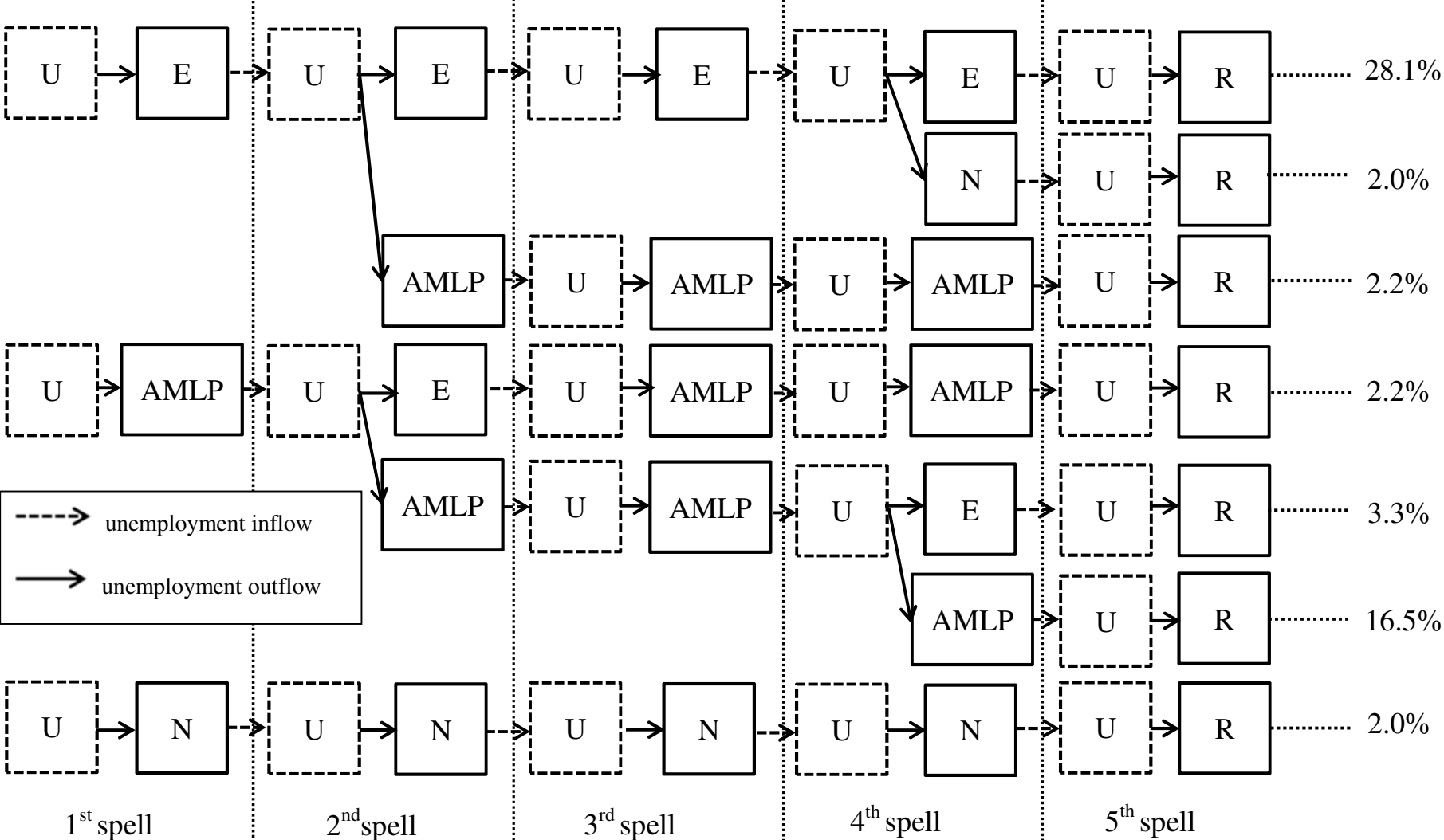
Source: own elaboration.

Figure 4. The 4-spell transitions pathways of at least 3% of observations

| | 1st spell | 2nd spell | 3rd spell | 4th spell |

Notes: U – unemployment, j – job seekers, E- employment, N – inactivity, ALMP – active labour market policy, R- retir... observations.**Source: own elaboration.**

Figure 5. The 5-spell transitions pathways of at least 2% of observations

Notes: U – unemployment, j – job seekers, E- employment, N – inactivity, ALMP – active labour market policy, R- retirement, other transitions comprise 43.7% of observations.

Source: own elaboration.

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