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JOB RETENTION AMONG OLDER WORKERS IN CENTRAL AND EASTERN EUROPE[1]

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Abstract

We study job retention rates – the shares of workers who continue to work in the same job over the next five years – in Czechia, Hungary, Poland and Slovakia. Job retention among older workers is key to prolonging careers and increasing employment of older people which in turn is a crucial challenge for these countries. We find that the retention rates among workers aged 55-59 are low as they amount to about a half of the retention rates among prime aged workers. Only in Poland the retention rates of older workers have increased for both men and women between 1998 and 2013. We find that the individuals least likely to retain their jobs after the age of 60, were women, those with lower educational level, those in agriculture or industry, in lower-skilled occupations, and those living with a non-working partner. Our research implies that the policies aimed at encouraging job retention in Central and Eastern Europe should focus on these groups of workers.

Keywords: job retention, retirement, transition to retirement, pension system, bivariate probit

JEL: J21, J26, J63

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Introduction

Population ageing is a challenge for many countries around the world, including countries in Europe. The share of people aged 60 or older in the global population is expected to rise from 12% in 2015 to 22% in 2050, and from 24% to 34% in Europe (United Nations, 2015). According to Eurostat projections (EPC, 2001) the gross public pension expenditure (as a share of GDP) in the EU is on track to rise by approximately 2 pp. between 2015 and 2050. Population ageing will accelerate particularly in Central and Eastern European countries (Lutz et al., 2008), where the employment rates among older workers are lower than in Western European countries.

A vast literature has explored the issue of active ageing. While promoting employment of people aged 55 and older has been identified as a key policy response (see reviews in Foster and Walker, 2013, 2015), achieving this goal in practice is a challenge, as finding a new job can be especially difficult for older people. In 2013 in the EU-28, 61% of unemployed individuals aged 55-64, compared to 50% of unemployed individuals aged 25-54, were long-term unemployed (Eurostat indicators). Older people are less able than younger people to change occupations (Tempest and Coupland, 2016) or to find re-employment, regardless of their last labour market status (Haltiwanger and Vodopivec, 2002; Magda and Ruzik-Sierdzińska, 2012; Tatsiramos, 2010). Few older workers return to work after exiting the labour market (OECD, 2006), especially if they expect the potential further employment to be of short duration (Hairault et al., 2010). In the US, the increase in the employment rates of older people in the 2000s was largely driven by the growth in the total tenure of workers in career jobs (Burtless, 2012). Given these findings, more attention should be paid to increasing job retention among workers nearing retirement, especially those with the lowest retention probabilities (i.e., highest potential for improvement), as job retention appears to be a major factor that could extend working lives.

The aim of our paper is to shed light on the determinants of job retention among older workers in four Central European countries: Czechia, Hungary, Poland, and Slovakia (CEE4). The retention rates and the changes in these rates over time differ substantially across these countries (OECD, 2015a), even though the CEE4 have relatively similar institutional arrangements (Brusis, 1999; Borbély and Neumann, 2015). While most previous studies focused on the psychological or the managerial aspects of job retention, in our study we examine the cross-country differences in retention probabilities, and identify their microeconomic determinants. We also identify the occupations and sectors with the lowest and the highest probabilities of job retention at older ages, and discuss the policy implications of our findings.

1. Job retention among older workers

Employment and job retention among older workers are shaped by both demand-side and supply-side factors, and are influenced by retirement and employment protection policies.

On the demand side, employers often prefer younger workers because of age-related stereotypes or perceived gaps in skills. While employers generally see older workers as being experienced, committed, knowledgeable, and resourceful, and as having high levels of interpersonal or specialised skills (Loretto and White, 2006; Posthuma and Campion, 2009); employers also tend to view older workers as being less productive, less adapted to physical work, more prone to health problems, more reluctant to participate in training (Loretto and White, 2006), and more costly than younger workers (Posthuma and Campion, 2009). Older workers are often discriminated against (Taylor and Walker, 2003) and may face harassment (Roscigno et al., 2007), as the negative stereotypes about older workers are persistent and difficult to change (Henkens, 2005), even if they are mostly untrue (Ng and Feldman, 2012). While the evidence on the relationship between productivity and age is mixed (see the literature review in van Dalen et al., 2010), employers expect that as workers age, their

productivity will decline or at best remain stable (van Dalen et al., 2009), while the costs of their employment (wages) will increase (Skirbekk, 2004; van Dalen et al., 2010). Thus, employers may see younger workers as superior to older workers due to age-based stereotypes or concerns about wage-to-productivity ratios.

On the supply side, workers' decisions to remain in the workplace (instead of retiring) are dependent on their attitudes towards their job and their degree of flexibility, as well as on the actions of their employers. Workers are more likely to continue working if they develop an attachment to the firm's mission and a sense of belonging (Mitchell et al., 2001; Brown and Yoshioka, 2003; Armstrong-Stassen and Schlosser, 2011), and are less likely to continue if they have the impression that the promises made to them are not being fulfilled (Kickul, 2001). They are also more likely to remain in the workplace if they have strong support from their supervisor (Eisenberger et al., 2002), a high degree of flexibility in their working conditions (Bal et al., 2012), and customised development opportunities (Armstrong-Stassen and Templer, 2005; Govaerts et al., 2011); but they are less likely to remain in a job if they feel that their skills are obsolete or that their career has peaked (Kooij et al., 2008). The retention intentions of older workers are heavily affected by their individual views regarding their work climate and their employer's efforts.

The decision about whether to continue working or to retire also depends on the financial condition of the older worker's household (Higgs et al., 2003; Dorn and Souza-Poza, 2010; Eichhorst et al., 2013), the worker's further life expectancy and health issues (van den Berg et al., 2010; Van Solinge and Henkens, 2010), and the levels of stress and pressure the worker is experiencing (Higgs et al., 2003; van den Berg et al., 2010). Older people are influenced in their decision about whether to retire by their spouse's views and health status (van Solinge and Henkens, 2007). Older workers are also prone to retiring when they have grandchildren (van Bavel and de Winter, 2013), with grandmothers generally more likely to provide childcare than grandfathers (Hank and Buber, 2009).

While governments have introduced policies aimed at protecting workers nearing retirement from forced job separation, these policies sometimes have negative side effects. Although dismissal protection can reduce the employment insecurity of older workers (Anderson and Pontusson, 2007), it may also distort the overall dynamics of job creation and destruction (Hairault et al., 2007; Chéron et al., 2008). Moreover, employment protections may be associated with a decrease in work commitment (Henkens, 2005), and the protected employees could be subject to indirect age discrimination (AARP, 2014). Finally, the old-age pension rules, the retirement age, and access to social transfers strongly influence the timing of retirement. Most workers retire as soon as the option becomes available (Social Protection Committee, 2007; Zappala et al., 2008), and many leave the workforce via early retirement schemes (OECD, 2015b) or social transfer programmes (Duval, 2003; Hairault et al., 2010). Workers who are less healthy or low-paid are most likely to leave the workforce early to live on a disability pension or unemployment benefits (Staubli and Zweimüller, 2013).

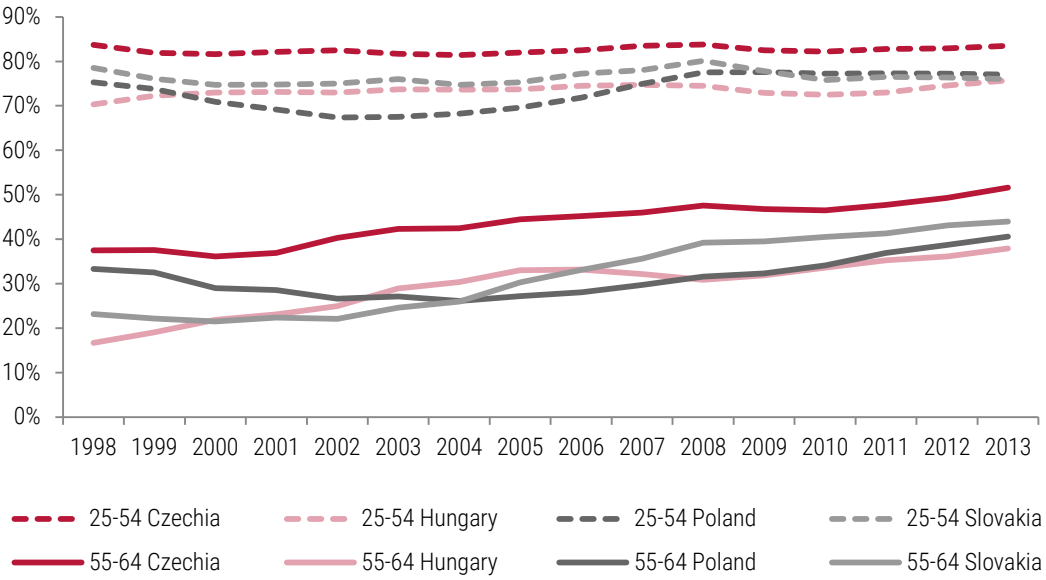
2. Employment among older people in the CEE4

2.1. Employment rates of older people

Between 1998 and 2013, people aged 55-64 in the CEE4 had much lower employment rates than individuals aged 25-54, with the employment rates of the older age group constituting at most 45% of the rates of the younger age group. However, the employment rates of older workers have increased over time. Of these countries, Czechia has reported the highest (and steadily rising) employment rates among older people, with the three remaining countries slowly catching up (see Figure 1). In Hungary, these rates were improving up to 2005. The employment rates of older workers were declining until 2002 in Slovakia and until 2004 in Poland, but later rebounded and grew noticeably in both countries.

In the 55-64 age group, the employment rates have generally been much higher among men than among women. Between 1998 and 2013 on average across the CEE4, except in Poland, these rates grew slightly more among women (18 pp.) than among men (13 pp.). In 2013, the difference between the employment rates of men (53% on average across the CEE4) and of women (35% on average) aged 55-64 was largest in Czechia (21 pp.) and smallest in Hungary (13 pp.).

Figure 1. Employment rates of prime-aged (25-54) and older (55-64) workers in CEE4, 1998-2013 (in %).



Source: Own elaboration based on Eurostat data.

2.2. Job retention among older workers

The OECD (2015a) has proposed a measure of job retention rates (henceforth, "OECD retention rates"), which is calculated as the number of employees in a five-year age group who work for at least five years in the same workplace, divided by the total number of employees five years younger and five years earlier.[2] We use the same definition, but apply it separately to males and females. The OECD retention rate, presented in Figure 2 and in Table A1 (Appendix A), is defined as:

$$RR_t = L_t^{>5;\, y,y+4} / L_{t-5}^{y-5,y-1},$$

where:

- t denotes the year from 2003 to 2013,
- RR_t is the OECD retention rate in year t,
- $L_t^{>5;\, y,y+4}$ is the number of employees aged from y to $y+4$ and working for at least five years in the same job in year t,
- $L_{t-5}^{y-5,y-1}$ is the number of all employees aged y-5 to y-1 in year $t-5$.

We use the EU Labour Force Survey data covering the period 1998-2013 for Czechia, Hungary, Poland, and Slovakia. The initial sample consists of 3.8 million observations of people aged 25-54 and 1.3 million

[2] We use "job retention" and "remaining in the workplace" interchangeably, but always refer to keeping the same job for at least five years.

observations of people aged 55-64. In line with the OECD (2015a), we drop the self-employed and helping family members and focus on employees (2.3 million observations of people aged 25-54 and around 345,000 observations of people aged 55-64).

Over the entire period studied, the OECD retention rates in the CEE4 were much lower for the older than for younger groups of workers (Table A1 in Appendix A). Among the youngest workers (aged 25-34), who were generally more likely to switch jobs, the OECD retention rates averaged 57% in 2003[3] and 52% in 2013. On average across the CEE4, workers aged 35-54 had relatively stable retention rates of around 70% in both 2003 and 2013, whereas workers aged 55-59 had retention rates of 48% in 2003 and 62% in 2013, and workers aged 60-64 had retention rates of 25% in 2003 and 30% in 2013. Thus, both the employment rates and the retention rates in the CEE4 were noticeably lower among the 60-64-year-olds than among the 55-59-year-olds over the study period. These descriptive statistics suggest that in the CEE4 job retention starts decreasing at age 55, and falls especially rapidly after age 60.

On average over the 2003-2013 period, the OECD retention rates for the 60-64 age group ranged from 18% in Czechia to 29% in Poland among women, and from 21% in Hungary to 36% in Poland among men. Between 2003 and 2013, the OECD retention rates for the 60-64 age group increased substantially among both men and women in Poland and among men in Czechia, fluctuated among both men and women in Slovakia, and decreased among both men and women in Hungary and among women in Czechia. The OECD retention rates were higher among men than among women over the whole period (average difference of 6 pp.),[4] except in Hungary between 2003 and 2008. Both the between-country and the between-gender differences in worker retention rates were substantial in the CEE4.

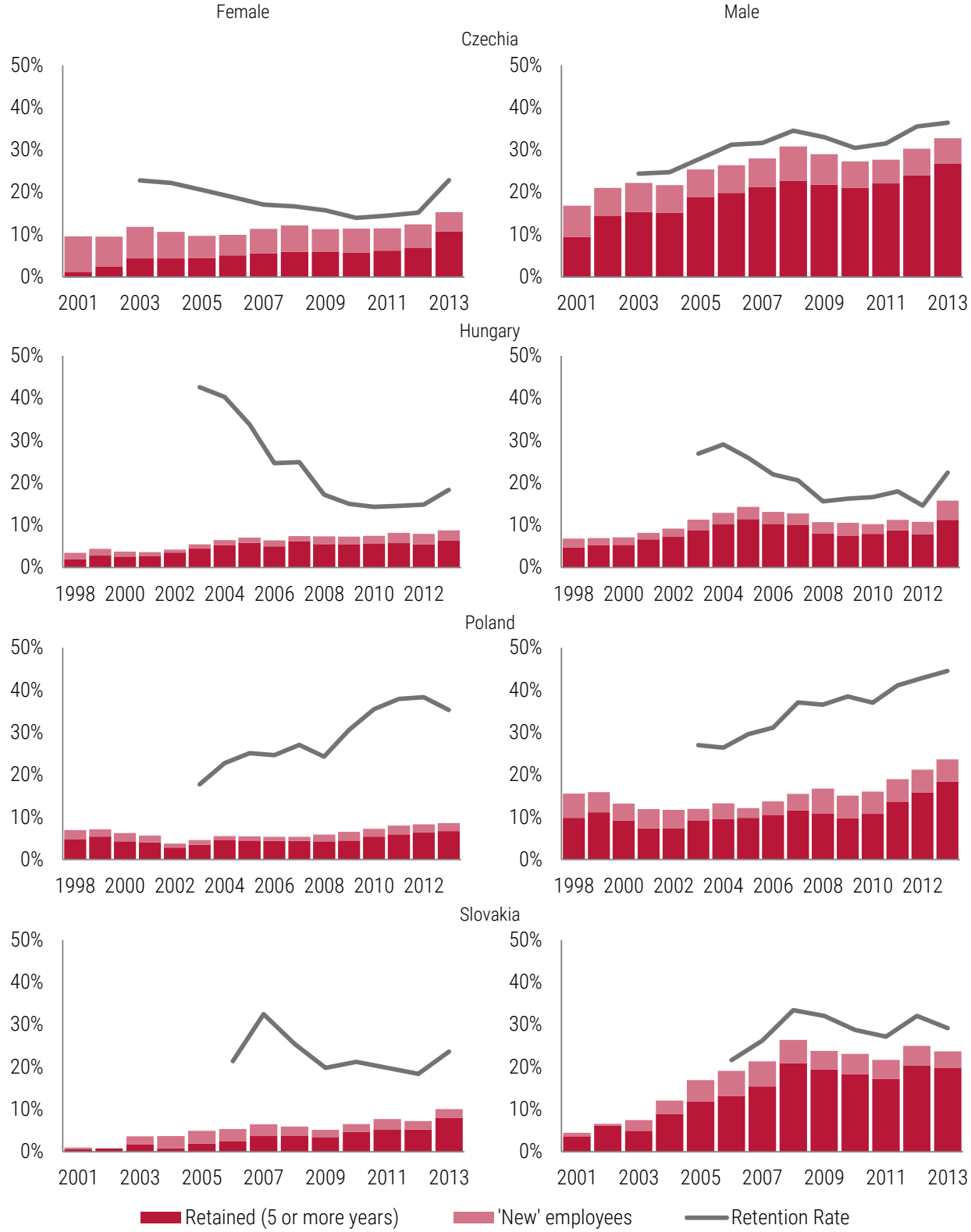
Among the individuals aged 60-64 in the CEE4, who were employed during the study period, most had been working in the same job for at least five years (approx. 65% for women and 75% for men, on average across countries and years).[5] Crucially, the increase in job retention was the main driver of employment growth. In Slovakia and Hungary, retained workers contributed more than 80% of the total net employment rate increase in this age group between 2001 and 2013. In Czechia and Poland, the contributions of retained workers even surpassed the total net employment rate increase, as the rate of newly hired workers aged 60-64 declined. As a result, the fractions of retained workers among all employees aged 60-64 rose between 1998 and 2013 (by 6 pp. among women and by 12 pp. among men on average across the CEE4), and increased most substantially in Czechia and Poland.

[3] Due to the small LFS sample size before 2006, the OECD retention rates for all age groups in Slovakia are reported for 2006 instead of for 2003.

[4] In 2013, the largest gender gap in the OECD retention rates was 14 pp. in Czechia.

[5] Except for female workers in Czechia until 2008.

Figure 2. Decomposition of employment rates into retained and new workers, and the OECD retention rates of men and women aged 60-64 in the CEE4, 2001-2013 (in %).



Note: The "new" employees are those with less than five years tenure in the current workplace, while the "retained" employees are those who have been working in the current workplace for at least five years. The sum of the shares of both groups in the population constitutes the employment rate. Due to small sample sizes, we used 2001 as a starting point for employment rates in Czechia and Slovakia, and 2006 as a starting point for the OECD retention rates in Slovakia.
Source: Own calculations based on EU-LFS data.

2.3. Retirement access and OECD retention rates among older workers

The pension policies in the CEE4 underwent multiple changes during the period studied, with most of these reforms aimed at prolonging working life. As these policies affected the retirement decisions of workers, they are likely to be related to the differences in the OECD retention rates across countries and between genders.

Table 1. Changes in the statutory retirement age

	Czechia		Hungary		Poland		Slovakia	
	F	M	F	M	F	M	F	M
Statutory retirement age:								
before reforms	53-57*	60	55	60	60	65	53-57*	60
after reforms	67	67	65	65	67	67	62	62
Period of changes	1996-2044	1996-2044	1999-2022**	1999-2022**	2013-2021	2013-2021	2005-2024	2005-2008
Mean statutory retirement age:								
in 2003	57	61.2	59	62	60	65	55	60
in 2013	59.5	62.5	62	62	60.2	65.2	59.1	62

*Note: * Before the reforms in Czechia and Slovakia, the retirement age for women was dependent on the number of children they had raised. The table presents the minimum (for women with five or more children) and the maximum (for women without children) values.*
*** In Hungary there are two periods of reform implementation: first, Hungary raised the retirement age to the level of 62 (starting in 2009 for women and in 2001 for men); and, second, starting in 2013, Hungary began increasing the retirement age to the target age of 65.*
Source: Own elaboration based on Cseres-Gergely (2014), European Commission (2015), Czech Social Security Administration (n.d.), Social Insurance Agency in Slovakia (n.d.), Ministry of Family, Labour and Social Policy in Poland (n.d.).

The statutory retirement age and the existence of early retirement options are the main factors that affect retirement eligibility. The statutory retirement age in the CEE4 countries has been gradually increasing, with the lower thresholds for female workers slowly catching up to those for male workers (see Table 1). Between 2003 and 2013, the statutory retirement age for women continued to be lower than 60 in Czechia and Slovakia, stayed at 60 in Poland, and was raised above 60 in Hungary; while the statutory retirement age for men was 65 in Poland, but remained between 60 and 64 in Czechia, Hungary, and Slovakia. Early retirement options were greatly reduced in Poland in 2009 (Ministry of Family, Labour and Social Policy in Poland, n.d.) and in Hungary in 2012 (Cseres-Gergely, 2014; European Commission, 2015). In Czechia, early retirement became less beneficial in 2012 (Czech Social Security Administration, n.d.).

Table 2. Shares of pension (old-age, survivor, or disability) benefit claimants in total population, by age groups (in %)

Age group	Year	Czechia		Hungary		Poland		Slovakia	
		Female	Male	Female	Male	Female	Male	Female	Male
60-64	2004	96	71	96	88	94	74	97	80
	2013	88	51	81	63	81	54	84	55
55-59	2004	55	23	59	45	67	43	70	19
	2013	26	22	32	23	26	28	24	21
50-54	2004	22	14	27	29	21	27	21	16
	2013	14	10	14	14	13	18	12	10

Note: People receiving pensions are defined as receiving non-zero income from old-age, survivor, or disability benefits. 2004 and 2013 are reported because of EU-SILC data availability.
Source: Own calculations based on EU-SILC data.

Disability and survivor benefits should be considered in tandem with old-age and early retirement pensions, as all of these transfers provide beneficiaries with a stable income, and thus influence labour market participation (European Commission, 2015). Table 2 shows that between 2004 and 2013, the shares of people claiming any of these benefits declined in all of the CEE4 countries, most notably among women aged 55-59. Moreover, the differences in claimant shares across the CEE4 countries shrank between 2004 and 2013, with the countries with relatively large claimant shares (Hungary and Poland) seeing the greatest reductions in these shares. Across the CEE4, the shares of both men and women claiming benefits were increasing with age. In 2004, the shares of benefit recipients were higher among women than among men in all age groups in

all countries. In 2013, this was still the case among people aged 55 and older, with the exception of people aged 55-59 in Poland.

In order to analyse whether—and, if so, to what extent—the retention rates of older workers were related to retirement and other pension policies over the study period, we estimated country-level panel fixed effects regressions that examined the relationship between the OECD retention rates and the shares of people receiving any of the listed benefits (results provided in Appendix B). The share of benefit claimants was statistically insignificant at a 5% level in a model for all people in the CEE4 aged 55-64 (from 2004 to 2013), as well as in separate models for the subsamples of men and women aged 55-59 or 60-64. We also ran separate regressions for all country-gender groups, which showed that a significant negative relationship between the retirement shares and the OECD retention rates existed only among women aged 55-59 in Slovakia and among all groups in Poland. This suggests that job retention among older people is shaped by factors other than outflows into retirement, and that a more in-depth, micro-level analysis of its determinants is needed.

3. Econometric methodology & data

Our aim in the current analysis is to identify the determinants of job retention at a micro level and their heterogeneity across countries and various groups of workers. To this end, we model the individual characteristics and circumstances related to the probability of job retention. We estimate the models separately for each country and gender, as in a pooled model the majority of interactions between country or gender and other explanatory variables is statistically significant. Our focus is on individuals aged 60-64, but we also analyse individuals aged 55-59 as a robustness check, and to infer which findings are specific to people aged 60-64, and which also apply to people aged 55-59. We use EU-LFS data for the period 2003-2013, although data for the 1998-2002 period are also used to derive some of the included values.

Since job retention is strongly related to the retirement decision, we model them jointly. We use a bivariate probit model that considers the two binary dependent variables by modelling their joint distribution. The model is described as follows (Greene, 2011):

$$y_1^* = x_1'\beta_1 + \varepsilon_1 , y_1 = 1 \; if \; y_1^* > 0, 0 \; otherwise,$$

$$y_2^* = x_2'\beta_2 + \varepsilon_2 , y_2 = 1 \; if \; y_2^* > 0, 0 \; otherwise,$$

$$E[\varepsilon_1 | x_1, x_2] = E[\varepsilon_2 | x_1, x_2] = 0,$$

$$Var[\varepsilon_1 | x_1, x_2] = Var[\varepsilon_2 | x_1, x_2] = 1,$$

$$Cov[\varepsilon_1 , \varepsilon_2 | x_1, x_2] = \rho,$$

where:

- y_1 is being a retained worker; i.e., having a current tenure of longer than five years, as defined in Section 2.2.; the reference group consists of those who had stopped working during the five years prior to the survey, or who had been working for less than five years when surveyed;
- y_2 is being a non-retired worker; i.e., neither retirement nor early retirement is the individual's "main labour status" (as defined in the EU-LFS).

Like the OECD (2015a), we omit the self-employed and helping family members. We identify retention and non-retention based on the current or last (for non-employed) labour status. The model does not include the currently non-employed individuals who were not employed five years earlier. We cannot, however, infer from

the data whether the workers who started a new job during the five years prior to the survey were also employed five years before the survey. We assume instead that the number of people who entered a new job when aged 60-64 (55-59) without having been employed when aged 55-59 (50-54) was negligible. We also cannot infer from the data whether the self-employed and helping family workers aged 60-64 were employed five years before the survey (which would identify them as non-retained workers). Moreover, the data do not allow us to observe individuals who were working at ages 55-59 but who died before reaching the age of 60. As a result, the retention rates calculated from our sample have a slightly different denominator than the OECD retention rates. Nevertheless, in the next section we show that our retention rates correlate well with the OECD retention rates.

The vectors of explanatory variables x_1 and x_2 consist of:

- education level attained, aggregated to three levels: low (ISCED 0-2 levels; lower secondary or lower), medium (ISCED 3-4 levels; upper secondary), and high (ISCED 5-8 levels; tertiary);[6]
- household structure, i.e., presence of other people in the household, whether they are working and whether one of them is a partner of the individual;
- occupation – ISCO (last occupation performed for jobless people);
- sector – NACE (last sector of work for jobless people);
- year dummies; and
- the gender-education-region-specific employment rate five years earlier.

The employment rates among the 55-59 (50-54) age group, measured five years before the year an individual aged 60-64 (55-59) was surveyed, are used as regressors to minimise the problem of potential selection bias related to individuals who were surveyed at the age of 60-64 (55-59) and were working five years earlier (Meng and Schmidt 1985). We use the LFS data for the 1998-2008 period to calculate the employment rates at ages 55-59 (50-54) by year, country, gender, education, and region (NUTS1) groups, and assign these values to the relevant individuals in our sample.

Table 3 shows the main characteristics of the 60-64 age group sample: the shares of workers who remained in their job for at least five years, became jobless, or entered a new job during the five years prior to the survey; divided into those who were and were not retired. Women were more likely than men to be working during retirement (average difference of 5 pp.), while non-retired men were more likely than women to no longer be working at all (average difference of 6 pp.).

Table 3 also presents the sample's descriptive statistics. Most of the individuals in the analysed samples had secondary education, and relatively large shares of people in Hungary and in Poland had tertiary education. In Hungary, the share of people with primary education was also large. The share of women living alone was larger (about 20%) than that of men (about 9%). Most of the people shared their household with at least one other person. The men were more likely than the women to be living with a spouse/cohabiting partner (on average, 85% versus 65%). Most of the individuals (almost two out of three) were living with someone who was non-employed. Many of the men aged 60-64 were employed in industry, while relatively large shares of the women were employed in the service, education, or health sector. Large shares of the workforce aged 60-64 were working in high-skilled occupations; i.e., as a professional, an associate professional, or a technician.

[6] We also use current level of education for those who left the workforce during the five years prior to the survey, as continuing education is very rare at ages 55-64: in the CEE4 in 2013, only approx. 0.06% of people aged 60-64 attained their current level of education between 2009 and 2013 (own calculations based on EU-LFS data).

The women were often working in clerical support jobs or in service or sales jobs; while the men were often working in manual jobs, such as craft and related trades jobs, or as plant and machine operators or assemblers.

Table 3. Descriptive statistics for individuals aged 60-64 who were working five years earlier, average over 2003-2013 (in %).

		Czechia		Hungary		Poland		Slovakia	
		F	M	F	M	F	M	F	M
Retained	*Retired*	4	2	2	1	2	1	7	3
	Non-retired	9	28	15	18	22	31	8	20
New workplace	*Retired*	9	4	1	1	1	1	7	3
	Non-retired	3	5	4	5	6	11	1	3
No longer working	*Retired*	74	55	73	69	66	41	75	66
	Non-retired	1	6	4	6	4	15	1	4
Education:									
Low		16	8	29	23	15	16	14	12
Medium		71	79	50	55	59	64	66	73
High		12	14	22	21	26	21	20	15
Other adults in household*:									
None		23	11	20	8	23	7	20	6
One, E and NP		4	1	8	1	5	1	5	1
One, E and P		16	20	7	16	12	13	11	12
One, NE and NP		3	2	5	2	4	1	4	2
One, NE and P		39	44	33	34	30	43	30	39
Two or more, E and NP		1	<1	3	1	3	1	4	1
Two or more, E and P		3	5	3	8	3	4	5	6
Two or more, NE and NP		1	1	4	1	3	1	3	1
Two or more, NE and P		10	16	17	27	17	28	19	33
Job sector:									
A. Agriculture		5	8	3	9	2	4	5	14
B-F. Industry		27	53	22	44	19	47	19	49
G-N. Services		29	23	29	24	30	30	26	20
O. Public		8	7	10	7	11	7	10	7
P. Education		15	4	19	8	20	7	23	6
Q. Health		13	3	13	4	13	3	13	3
R-U. Other		4	2	4	4	5	3	4	2
Occupation (ISCO):									
1: *Managers*		3	6	6	10	7	9	3	6
2: *Professionals*		13	8	16	13	25	13	21	8
3: *Technicians and associate professionals*		23	17	17	9	19	11	22	14
4: *Clerical support workers*		16	3	16	4	13	4	12	3
5: *Service, shop and market sales workers*		16	5	13	7	13	8	16	6
6: *Skilled agricultural, forestry, and fishery workers*		2	1	1	3	1	1	1	1
7: *Craft and related trades workers*		5	29	4	30	5	25	4	27
8: *Plant and machine operators, and assemblers*		8	22	8	17	2	18	5	22
9: *Elementary occupations*		14	8	19	8	16	10	16	12
Observations		29,976	42,107	32,315	37,930	20,132	30,834	9,961	20,380

Note: [x] *E stands for "all employed", NE for "somebody non-employed", P for "with partner", and NP for "without partner".*
Source: Own calculations based on EU-LFS data.

4. Job retention at the worker level - econometric results

In this section we discuss the estimation results. We focus on the 60-64 age group, and indicate the similarities and differences we found between this group and the 55-59 age group (results are provided in Appendix D).

4.1. Correlates of job retention in the 60-64 and 55-59 age groups

Table 4 presents the results for the job retention equation of the bivariate probit model estimated for the individuals aged 60-64. We found that the higher the education level of a worker (both male and female), the higher the probability of job retention at ages 60-64. The same result was found for women aged 55-59, although among men aged 55-59 the highest probability of job retention was found for medium (low in Hungary) educated workers.

Compared to workers living alone, workers living with an employed person were more likely to remain employed in the same job, while workers living with a non-employed person were less likely to remain employed in the same job. The former relationship was stronger among men, while the latter relationship was stronger among women, and it was particularly strong if the co-habitant was a partner of the individual. While Van Solinge and Henkens (2007) noted that the influence of the spouse on retirement decisions is ambiguous, Atalay and Barrett (2016) showed that raising the statutory retirement age of women increases the labour market participation of the husbands of the affected women, which is consistent with our findings.[7]

Among workers aged 60-64 in the CEE4 countries, the highest job retention probabilities were in the health and "other" sectors[8], while the lowest probabilities were in agriculture and industry. Notably, male workers aged 60-64 in health and education were more likely to remain in their job than female workers. Many researchers have noted that around the world, the health sector in particular is burdened by the ageing of the population, and could benefit from the retention of older nurses and doctors (Sibbald et al., 2003; O'Brien-Pallas et al., 2004; Moseley et al., 2008; Heinen et al., 2013; for a review on the retention of older nurses, see Uthaman et al., 2016).[9] In the CEE4, the health sector already has a relatively high retention rate. The probabilities of retention for workers aged 55-59 and for male workers aged 60-64 were also relatively high in the education sector. Retention is particularly important in education, as teacher turnover has been shown to be negatively related to student performance (Ronfeldt et al., 2013).[10] Interestingly, women aged 55-59 in public services were likely to remain in the same workplace (relative to women in other sectors), while the opposite was true among men.

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[7] Atalay and Barrett (2016) linked this to preferences for shared leisure and wealth effects. Our data do not allow us to control for such effects.

[8] The category "other" consists of the following sectors: arts, entertainment, and recreation; other service activities; activities of households as employers; undifferentiated goods- and services-producing activities of households for own use; activities of extraterritorial organisations and bodies.

[9] Burnout and unsatisfactory workplace conditions are cited as major contributors to job turnover among nurses (Laschinger et al., 2009; Heinen et al., 2013). However, other scholars (e.g., Reinhardt, 2003; Strunk et al., 2006; White, 2007; Pan et al., 2008; Rechel et al., 2013) have argued that the burden of ageing has been overstated.

[10] Majchrowska et al. (2015) showed that a large gender pay gap exists among university and higher education teachers in Poland, which could explain the gender differences in retention probabilities.

Table 4. Mean marginal effects for job retention from bivariate probit regression, people aged 60-64 and working five years earlier

	Czechia		Hungary		Poland		Slovakia	
	Female	Male	Female	Male	Female	Male	Female	Male
Prob. employed 5 years before	0.19***	0.27***	-0.02	0.04	0.18***	0.07	0.16***	0.19***
Education:	*Base level: Medium*							
Low	0.02**	-0.05***	-0.04***	-0.07***	-0.05***	-0.07***	-0.02	-0.06***
High	0.04***	0.06***	0.06***	0.08***	0.07***	0.06***	-0.01	0.02*
Household (other people)[x]:	*Base level: Living alone*							
One, E and NP	0.03**	0.01	0.04***	0.01	0.00	0.01	0.00	0.08**
One, E and P	0.01*	0.11***	0.08***	0.10***	0.01	0.10***	0.04***	0.13***
One, NE and NP	0.01	0.03	-0.01	0.03*	0.03*	-0.14***	-0.00	0.03
One, NE and P	-0.07***	-0.06***	-0.08***	-0.04***	-0.06***	-0.01	-0.04***	-0.04***
Two or more, E and NP	-0.01	0.04	0.03**	0.11***	-0.03	0.04	-0.03	0.01
Two or more, E and P	0.06***	0.17***	0.05***	0.10***	0.05**	0.11***	0.05***	0.15***
Two or more, NE and NP	0.06***	-0.11***	0.03**	0.02	0.00	-0.04	-0.03	-0.03
Two or more, NE and P	-0.05***	0.02	-0.01	0.03***	-0.04***	0.03**	-0.02*	0.03**
Occupation (ISCO):	*Base level: ISCO 5. Service, shop and market sales workers*							
1. Managers	0.09***	0.16***	0.03*	-0.01	0.09***	0.10***	0.05**	0.09***
2. Professionals	0.05***	0.13***	0.03**	0.01	0.09***	0.13***	0.08***	0.10***
3. Technicians and (…)	0.05***	0.09***	0.03***	-0.04***	0.10***	0.06***	0.02	0.02
4. Clerical support workers	0.04***	0.08***	-0.00	-0.06***	0.04**	0.06***	-0.01	0.01
6. Skilled agricultural, (…)	-0.04	-0.02	-0.07***	-0.05***	0.09**	-0.08**	-0.09**	-0.00
7. Craft and related (…)	-0.03*	0.03*	-0.00	-0.06***	-0.08***	-0.07***	-0.11***	-0.03***
8. Plant and machine (…)	-0.02	0.03*	-0.02	-0.06***	-0.10**	-0.08***	-0.10***	-0.02*
9. Elementary occupations	-0.00	-0.05***	0.03***	-0.03**	0.01	-0.02	-0.01	-0.02
Sector (NACE):	*Base level: G-N. Services*							
A. Agriculture	-0.03*	-0.01	-0.00	-0.04***	-0.03	0.06***	-0.02	-0.05***
B-F. Industry	-0.04***	-0.04***	-0.06***	-0.04***	-0.04***	-0.01	-0.06***	-0.03***
O. Public	0.04***	-0.02	-0.02**	-0.03***	0.01	0.12***	-0.02	-0.00
P. Education	0.01	0.04**	-0.03***	0.04***	-0.03**	0.11***	-0.02**	0.04***
Q. Health	0.04***	0.04**	0.02**	0.08***	0.03**	0.19***	0.05***	0.06***
R-U. Other	0.06***	0.08***	0.04***	0.10***	0.07***	0.17***	0.08***	0.01
Year:	Base level: 2003							
2004	-0.00	0.00	-0.00	-0.01	-0.08*	-0.15***	-0.12**	0.10***
2005	-0.01	0.07***	-0.03	-0.01	-0.09**	-0.14***	-0.04	0.16***
2006	-0.01	0.07***	-0.07***	-0.03	-0.09**	-0.12***	-0.00	0.16***
2007	-0.01	0.09***	-0.06***	-0.04**	-0.10***	-0.08**	0.06	0.21***
2008	-0.02	0.11***	-0.10***	-0.06***	-0.09**	-0.09***	0.05	0.27***
2009	-0.01	0.10***	-0.13***	-0.08***	-0.06	-0.13***	0.03	0.26***
2010	-0.04**	0.09***	-0.15***	-0.08***	-0.04	-0.10***	0.06*	0.25***
2011	-0.03*	0.09***	-0.15***	-0.06***	-0.01	-0.05*	0.04	0.24***
2012	-0.03*	0.12***	-0.16***	-0.07***	-0.01	-0.02	0.01	0.26***
2013	0.01	0.15***	-0.14***	-0.02	-0.00	0.01	0.06	0.24***
Observations	29,976	42,107	32,315	37,930	20,132	30,834	9,961	20,380

*Note: Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1*

[x] E stands for "all employed", NE for "somebody non-employed", P for "with partner", and NP for "without partner".

Source: Own estimations based on the EU-LFS data.

We also found that workers aged 60-64 in all lower-skilled occupations were the least likely to be retained, while workers aged 55-59 were less likely to be retained only as skilled agricultural, forestry, and fishery workers and in elementary occupations. Managers (and professionals among 55-59-year-olds) were among the occupations with the highest probability of retention. Although Hom et al. (2008) noted that men tend to dominate while women face difficulties in executive positions, our results for the CEE4 do not show a consistent difference between male and female managers' probabilities of job retention (at least relative to other occupations).

The potential sample selection (i.e., the probability of having worked five years earlier) turned out to be statistically significant for all workers aged 60-64 and 55-59 in Czechia and Slovakia, for women aged 60-64 in

Poland, and for men aged 55-59 in Hungary. The relationship was positive, which suggests that individuals belonging to groups with higher employment rates at ages 50-54 (55-59) were subsequently more likely to remain in the same jobs at ages 55-59 (60-64).

Our results also show that the probability of retention among people aged 60-64 improved between 2003 and 2013 for all workers in Slovakia and for men in Czechia, but decreased for all workers in Hungary. In Poland, the retention probability trends were U-shaped for both genders, increasing from 2007 for women and from 2009 for men. For people aged 55-59, the trends were positive, and the steepest improvements were among women in Slovakia, Czechia, and Poland; and among men in Poland.

The retention rates predicted by the model correlate with annual means of the explained variable at a 99% level, and exhibit patterns of changes similar to those of the OECD retention rates, with an average correlation of 80% among women (lowest for Slovakia: 51%) and of 88% among men (lowest for Poland: 72%) aged 60-64 (see Figure E1 and Table E1 in Appendix E).

4.2. The decomposition of retention rate changes over time

In the next step, we decompose the changes in the predicted retention rates using the Blinder-Oaxaca methodology (Blinder, 1973; Oaxaca, 1973), and particularly its three-component extension (e.g., Jones and Kelley, 1984). We seek to determine to what extent the recorded changes in the retention rates were related to changes in endowments; that is, in the composition of employment (by characteristics which influence the retention probabilities), and to what extent they are driven by changes in the estimated coefficients which are related to particular characteristics' correlations.

To this end, we analyse the changes between 2003-2005 and 2011-2013 by modelling the two periods separately with a bivariate probit model analogous to the whole period model, but without year dummies. We use three years of data for the start and end in order to average out possible single-year deviations from the general trend. We decompose the changes into the contribution of the change in variable values (endowments), coefficients, and interactions; in line with the following equations:

$$PRP_{2011-2013} - PRP_{2003-2005} = Endowments + Coefficients + Interaction,$$

$$Endowments = (X_{2011-2013} - X_{2003-2005}) * \beta_{2003-2005},$$

$$Coefficients = (\beta_{2011-2013} - \beta_{2003-2005}) * X_{2003-2005},$$

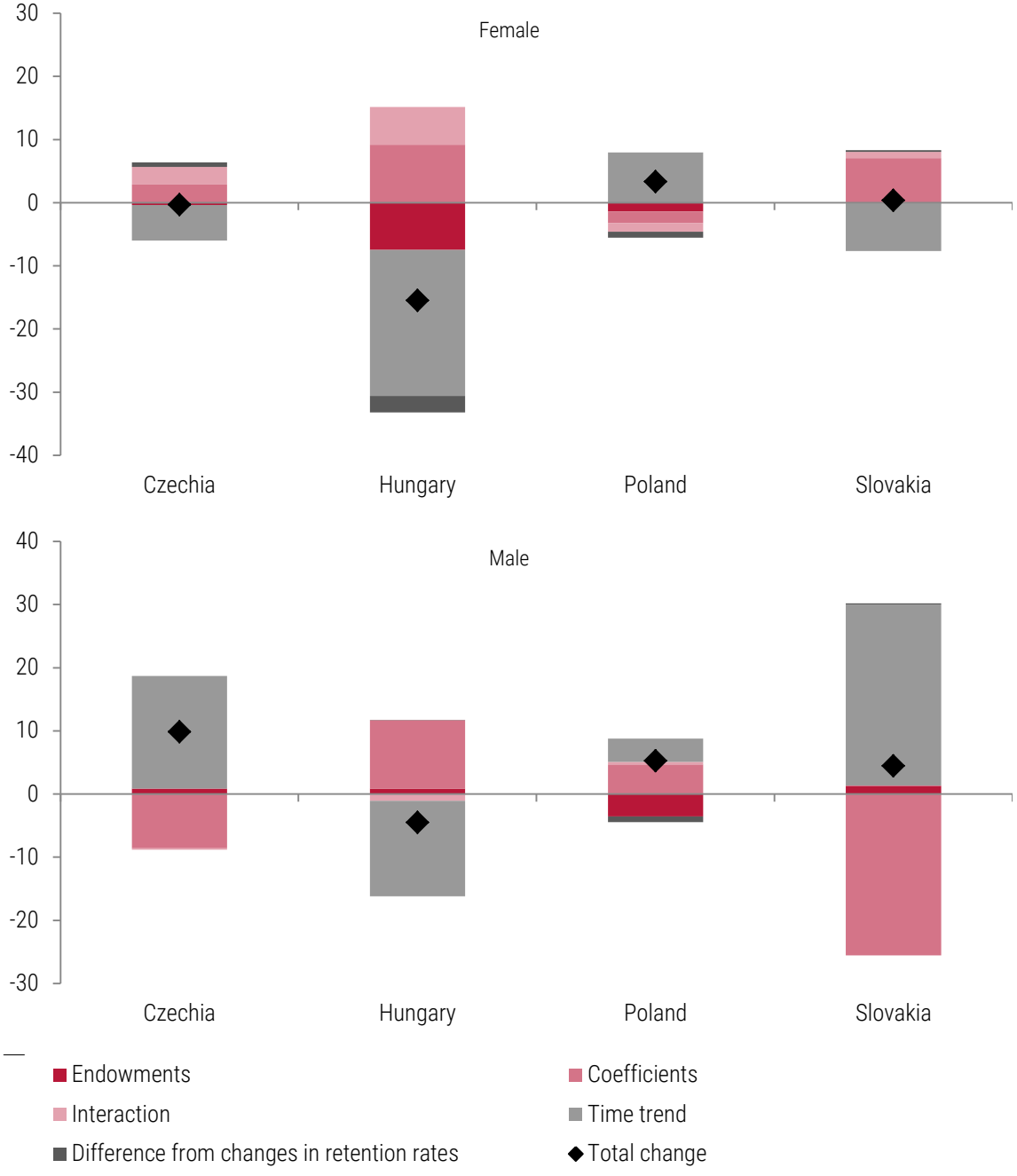
$$Interaction = (X_{2011-2013} - X_{2003-2005}) * (\beta_{2011-2013} - \beta_{2003-2005}),$$

where:

- PRP_{t-t+2} is the predicted retention rate averaged for the period from year t to year $t+2$,
- X_{t-t+2} is the vector of determinants for the period from year t to year $t+2$, and
- β_{t-t+2} is the vector of parameters (including the intercept) for the period from year t to year $t+2$.

We follow the application to non-linear binary dependent variables described by Yun (2004), and use a modified version of the *oaxaca* command in Stata (original by Jann, 2008) in order to accommodate the bivariate probit specification. Figure 3 presents the changes decomposed into aggregated contributions of changes in endowments, coefficients, the time trend (the change in the intercept), and interactions.

Figure 3. Three-component decomposition of the changes in the predicted job retention rates between 2003-2005 and 2011-2013 among people aged 60-64 in the CEE4 (in pp.).



Note: The change for Slovakia is between 2006-2008 and 2011-2013. "Total change" does not include the difference from changes in retention rates.
Source: Own estimations based on the EU-LFS data.

Our results show that the changes in coefficients were the dominant factor behind changes in the predicted retention rates between 2003-2005 and 2011-2013. These changes had a substantial positive effect on the retention rates of women in Czechia, Hungary, and Slovakia and of men in Hungary and Poland. This means that among these groups of workers, the older individuals in 2011-2013 had (personal and workplace) characteristics more conducive to remaining in the same job than their counterparts in 2003-2005 had possessed. The opposite was the case among men in Czechia and Slovakia and among women in Poland (but the effect was very small). The changes in characteristics (endowments) made a noticeable contribution only among women in Hungary and among men in Poland – in both cases, the contribution was negative.

Table 5. Decomposition of the changes in the retention probabilities of women, between 2003-2005 and 2011-2013

	Czechia		Hungary		Poland		Slovakia	
	Endow.	Coeff.	Endow.	Coeff.	Endow.	Coeff.	Endow.	Coeff.
Prob. employed 5 years before	0.01	0.05	- 0.06	0.07	- 0.02	- 0.01	- 0.00	0.04
Education:	*Base level: Medium*							
Low	0.00	0.00	0.02	0.06	0.00	- 0.00	0.00	0.00
High	-0.00	- 0.00	- 0.01	- 0.03	- 0.01	- 0.05	0.00	- 0.02
Household (other people)[x]:	*Base level: Living alone*							
One, E and NP	-0.00	-0.00	0.00	0.01	0.00	-0.00	0.00	-0.01
One, E and P	0.00	-0.00	-0.00	0.00	0.00	-0.01	0.00	-0.01
One, NE and NP	-0.00	0.00	-0.00	0.00	0.00	-0.00	-0.00	0.00
One, NE and P	-0.00	-0.01	-0.00	0.01	0.00	-0.02	0.00	-0.00
Two or more, E and NP	-0.00	-0.00	-0.00	0.00	0.00	0.00	-0.00	0.01
Two or more, E and P	-0.00	-0.00	-0.00	0.00	0.00	0.00	0.00	-0.01
Two or more, NE and NP	-0.00	-0.00	0.00	-0.00	-0.00	-0.00	-0.00	-0.00
Two or more, NE and P	-0.00	0.00	-0.00	0.00	-0.00	-0.02	0.00	-0.02
Occupation (ISCO):	*Base level: ISCO 5. Service, shop and market sales workers*							
1. Managers	-0.00	-0.00	-0.00	-0.00	-0.00	0.02	-0.00	0.00
2. Professionals	0.00	0.00	-0.00	0.00	0.00	0.07	0.00	0.00
3. Technicians and (…)	-0.00	0.00	-0.00	0.00	-0.00	0.02	-0.00	0.03
4. Clerical support workers	0.00	0.00	0.00	-0.01	-0.00	0.00	-0.00	-0.00
6. Skilled agricultural, (…)	-0.00	0.00	0.00	-0.00	0.00	0.00	0.00	0.00
7. Craft and related (…)	-0.00	0.00	-0.00	-0.01	0.00	-0.01	0.00	-0.00
8. Plant and machine (…)	-0.00	0.00	-0.01	0.00	0.00	-0.00	-0.00	-0.01
9. Elementary occupations	0.00	-0.00	0.00	0.01	0.00	-0.01	0.00	0.01
Sector (NACE):	*Base level: G-N. Services*							
A. Agriculture	0.00	-0.00	0.00	-0.00	0.00	-0.01	0.00	0.00
B-F. Industry	-0.00	-0.01	-0.01	0.01	-0.00	-0.01	0.00	0.01
O. Public	-0.00	-0.00	0.00	-0.00	-0.00	-0.01	0.00	0.00
P. Education	-0.00	-0.00	-0.00	-0.03	-0.00	-0.00	-0.00	0.03
Q. Health	0.00	-0.00	-0.00	-0.01	0.00	0.02	-0.00	0.01
R-U. Other	-0.00	-0.00	-0.00	-0.00	-0.00	0.00	0.00	0.00
Year change effect (constant)	-0.06		-0.23		0.08		-0.08	
Interaction (aggregate)	0.03		0.06		-0.01		0.01	
Observations	7,688		16,677		12,278		7,065	

*Note: Years 2006-2008 used instead of years 2003-2005 in Slovakia due to poor data quality in years 1998-2002 (used for employee variable derivation). Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1*

[x] E stands for "all employed", NE for "somebody non-employed", P for "with partner", and NP for "without partner".

Source: Own estimations based on the EU-LFS data.

The contributions of particular explanatory variables are reported in Tables 5 (women) and 6 (men). We found that the single variable that contributed most was the probability of having worked five years earlier, which suggests that an increasing selection into a longer working life was already taking place at ages 55-59. This result also underlines the importance of high levels of employment at the late prime-age stage for employment prospects in the pre-retirement stage. This effect was particularly noticeable among women in Czechia, Hungary, and Slovakia and among men in Hungary and Poland. In Hungary, the probability of retention became more comparable across education levels, with the probability decreasing among the tertiary educated and increasing among the primary educated. Among men in Slovakia, the probability of non-retention was greater for those who were living with a non-working partner. Among women in Poland and men

in Hungary, workers in high-skilled occupations, particularly professionals, became much more likely to remain in the same job when reaching the age of 60-64

Table 6. Decomposition of the changes in retention probabilities of men, between 2003-2005 and 2011-2013

	Czechia		Hungary		Poland		Slovakia	
	Endow.	Coeff.	Endow.	Coeff.	Endow.	Coeff.	Endow.	Coeff.
Prob. employed 5 years before	0.01	-0.03	-0.00	0.09	-0.00	0.05	0.01	-0.08
Education:	*Base level: Medium*							
Low	0.00	0.00	0.02	0.07	0.01	0.02	0.00	0.01
High	-0.00	-0.00	-0.00	-0.04	-0.00	-0.01	-0.00	-0.01
Household (other people)[x]:	*Base level: Living alone*							
One, E and NP	0.00	-0.00	0.00	-0.00	-0.00	-0.00	0.00	-0.00
One, E and P	0.00	0.00	0.00	-0.02	0.00	-0.00	0.01	-0.01
One, NE and NP	0.00	0.00	-0.00	0.00	-0.02	0.02	-0.00	-0.00
One, NE and P	0.00	-0.00	-0.00	-0.01	-0.00	-0.00	-0.00	-0.05
Two or more, E and NP	-0.00	-0.00	0.00	0.00	-0.00	-0.00	0.00	-0.00
Two or more, E and P	-0.00	0.00	-0.00	-0.00	0.00	0.00	0.00	-0.00
Two or more, NE and NP	0.00	-0.00	0.00	-0.00	-0.00	0.00	0.00	-0.00
Two or more, NE and P	-0.00	-0.00	0.00	0.00	0.00	-0.00	-0.01	-0.05
Occupation (ISCO):	*Base level: ISCO 5. Service, shop, and market sales workers*							
1. Managers	0.00	-0.00	0.00	0.03	-0.00	0.00	-0.00	0.00
2. Professionals	-0.00	-0.00	0.00	0.03	-0.01	0.00	-0.00	0.00
3. Technicians and (…)	-0.01	-0.01	-0.00	0.01	0.00	-0.00	-0.00	0.00
4. Clerical support workers	0.00	-0.00	0.00	-0.00	-0.00	0.00	0.00	-0.00
6. Skilled agricultural, (…)	-0.00	-0.00	0.00	-0.00	-0.00	-0.00	-0.00	-0.00
7. Craft and related (…)	0.00	-0.03	-0.00	0.02	-0.00	0.00	-0.00	-0.01
8. Plant and machine (…)	0.00	-0.02	-0.00	0.01	0.00	-0.01	-0.00	-0.02
9. Elementary occupations	0.00	-0.00	0.00	-0.01	-0.00	-0.02	-0.00	-0.01
Sector (NACE):	*Base level: G-N. Services*							
A. Agriculture	0.00	0.00	0.00	-0.00	- 0.00	0.00	0.00	- 0.00
B-F. Industry	-0.00	0.02	-0.00	-0.02	- 0.00	0.00	0.00	- 0.02
O. Public	0.00	-0.01	0.00	-0.01	- 0.00	- 0.00	0.00	- 0.00
P. Education	-0.00	-0.00	-0.00	-0.02	- 0.00	- 0.00	- 0.00	- 0.00
Q. Health	-0.00	0.00	-0.00	-0.01	- 0.00	- 0.00	0.00	0.00
R-U. Other	-0.00	0.00	-0.00	-0.01	- 0.01	- 0.00	- 0.00	0.00
Year change effect (constant)	0.18		-0.15		0.04		0.29	
Interaction (aggregate)	-0.00		-0.01		0.00		0.00	
Observations	11,218		18,349		19,361		13,215	

*Note: Years 2006-2008 used instead of years 2003-2005 in Slovakia due to poor data quality in years 1998-2002 (used for employee variable derivation). Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.*

[x] E stands for "all employed", NE for "somebody non-employed", P for "with partner", and NP for "without partner".

Source: Own estimations based on the EU-LFS data.

Importantly, the contributions of time trends (of the change in the intercept) were of comparable or larger magnitudes than those of endowments, coefficients, and interactions together. These contributions were positive for both male and female workers in Poland and among men in Czechia and Slovakia. This suggests that the overall job retention probabilities were increasing over time for these workers. The opposite was the case for women in Czechia and Slovakia and among both male and female workers in Hungary. In three instances, these increases in overall job retention probabilities overlapped with changes in the statutory

retirement age or pension system reforms aimed at prolonging working lives. In Poland, early retirement eligibility was limited in 2009 and the statutory pension age was increased in 2012 (Chłoń-Domińczak et al., 2016, found that these reforms had a positive effect on the employment rates of older workers in Poland). The statutory retirement age increased over the study period from 61.2 to 62.5 for men and from around 57 to around 59.5 for women in Czechia, as well as from 60 to 62 for men and from around 55 to around 59.1 for women in Slovakia. Thus, in Czechia and Slovakia the changes of the statutory retirement age were mostly likely to affect men aged 60-64 and women aged 55-59 (estimation results, reported in Table D1 in Appendix D, show a large positive trend in job retention probabilities among women aged 55-59). While we are not able to test for the causality of these reforms, we think that these developments were related. In contrast, in Hungary the retention rates decreased, especially among women, despite their statutory retirement age having increased from 59 to 62 during the period studied. However, Cseres-Gergely (2014) notes that the increase in statutory retirement age of women in Hungary reduced the retirement pension claims but that the effect was counterbalanced by additional disability pensions claims, which also explains why the retention rates of women failed to increase.

4.3. Non-retirement equation

We found that the decision not to retire was related to individual and job characteristics in ways that were similar to the decision to remain in the same job. The marginal effects from the non-retirement equation for individuals aged 60-64 and 55-59 are presented in Appendix C and Appendix D, respectively. We do not discuss them in detail, because we use the bivariate probit mainly as a way to obtain credible estimates of the job retention equation. Table 7 shows that the correlations between the residuals from both bivariate probit equations are significant for all country-gender models. These correlations averaged 91% for individuals aged 60-64 and 85% for individuals aged 55-59. Thus, job retention was strongly related to non-retirement, and the bivariate probit model was an appropriate choice in this context.

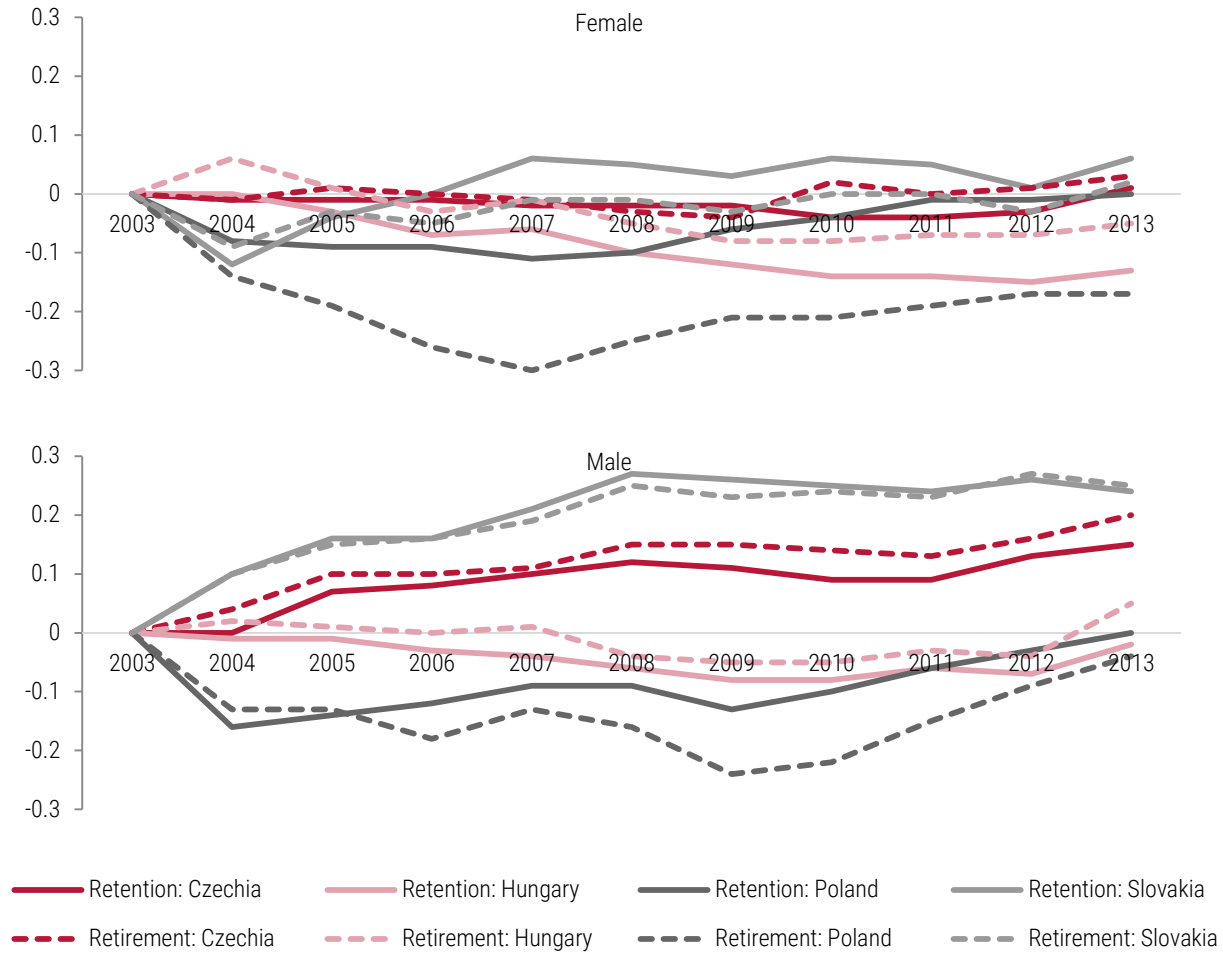
Table 7. Correlations of the error terms from the two equations in bivariate probit regressions (in %)

	Czechia		Hungary		Poland		Slovakia	
	F	M	F	M	F	M	F	M
60-64	88	94	92	93	94	87	86	92
55-59	93	79	92	84	94	74	90	74

Source: Own calculations based on EU-LFS data.

Moreover, the correlations of marginal effects from the non-retirement and the job retention equations averaged 80% in regressions for people aged 60-64. The correlation of the marginal effects for job and individual characteristics was no lower than 60% (in Poland). The correlation of the time trends (i.e., the changes captured with the year dummies) averaged 76% across all models, and were as high as 85% if women in Czechia (among whom the correlation of time trends was only 14%) were excluded. This suggests that the year dummies capture some factors that may affect both outcomes, such as changes in retirement options (e.g., the statutory retirement age). In line with this conjecture, the U-shaped path of the estimated year effects in the non-retirement equation for Poland (see Figure 4) is consistent with the introduction of early retirement reforms in 2008. For people aged 55-59, the correlations of the marginal effects of all of the variables from both equations were smaller: 58% on average, and larger for women (77%) than for men (39%).

Figure 4. Marginal effects of year dummies for job retention and non-retirement equations among people aged 60-64.



Note: Lines connect the marginal effects of year dummies from Tables 4 and C1.
Source: Own elaborations based on regression from Tables 4 and C1.

4.4. Robustness check: wage deciles

One concern regarding our model is that we do not include wages among our explanatory variables. Wages might be significant determinants of retention, and are also correlated with occupations. However, the EU-LFS contains data on wages only since 2009, only in deciles, and for only some respondents — limitations that substantially reduce the sample. Moreover, there are no data on income from the last job of individuals who are no longer working. Therefore, we imputed wages for individuals and years missing such information, and ran a separate set of regressions as a robustness check to see whether our results changed. In order to impute wages, we calculated the median deciles within occupations in 2009 (with ISCO-88 occupational codes in the EU-LFS) and 2011 (with ISCO-08 occupational codes in the EU-LFS) for each country, gender, and (when the distinction was possible) part/full-time employment; and imputed them backwards from 2009 and forwards from 2011.

The results of the regressions with wages are presented in Appendix F. The inclusion of the imputed labour income has only a minor effect on the marginal effects from our models, except for the occupational dummies. The dummies for wages were statistically significant, and the workers in the lower-medium paid jobs (4^{th}-5^{th} deciles) were the least likely to be retained. The workers with lower and higher wages had larger retention probabilities, and the best-paid workers were the most likely to be retained. However, when controlling for wages, managers proved to be among those least likely to be retained, and professionals also

had relatively low retention probabilities. Skilled agricultural, forestry, and fishery workers turned out to be the group who were least likely to be retained.

The omission of wage deciles ascribes much of the wage effect to the occupational dummies, as the two are highly correlated. However, including the imputed wages impairs the quality of the predictions. The correlations between the OECD retention rates and the retention rates predicted by the model with wages were, on average, 9 pp. smaller than those with retention rates predicted from the model without wages. The largest difference was found for Poland: 17 pp. for women and 32 pp. for men. These disparities might stem from the differing distributions of wage deciles across the occupations of those who did not report their wages, or from changes in the distribution of wages across occupations over the period studied, or from differing distributions of wages in the last job among the individuals who were no longer employed. Regardless of the reason why, the marginal effects of the remaining variables are comparable with and without the inclusion of wage deciles, which suggests that even though the interpretation of the occupational dummies requires us to account for the associated wages, the model without wages is more reliable, and the results are otherwise robust.

Table 8. Correlations between the OECD retention rates and the modelled retention rates from the model with and without wage deciles (in %) for people aged 60-64

	Czechia		Hungary		Poland		Slovakia	
	F	M	F	M	F	M	F	M
Model without wage deciles	69	97	98	89	88	83	35	92
Model with wage deciles	57	97	96	87	71	51	27	92

Source: Own calculations based on EU-LFS data.

Conclusions and policy implications

Dealing with population ageing and the problems associated with prolonging working life are among the main challenges facing European countries. As older workers tend to have more difficulties than younger workers in finding new employment, it is crucial that we understand the factors that can help older workers to keep their job and remain in the workplace longer. Public policy should support these processes. In this paper, we analysed the determinants of job retention among workers approaching retirement age in four Central Eastern European countries. While much has been said about the demand for older workers, employer-side strategies, and the factors that influence the decision to keep working, such as pensions; there has been less discussion about the national context and the individual characteristics of the people who retain their job as they approach retirement. Our research fills this gap by analysing job retention among people aged 60-64 (and 55-59) in four Central European countries that experienced different changes in retention rates between 2003 and 2013. We focused on worker traits and workplace characteristics, and analysed each gender separately.

We found that workers with lower educational attainment, in agriculture or industry, in a lower-skilled occupation, and living with a non-working partner were the least likely to retain their job. On the other hand, workers with tertiary education, in a high-skilled job, in the education or health sector, and living with a working partner were the most likely to remain in their job after the age of 60. The job retention rates of women were generally lower than those of men, a gap that can be attributed to some extent to a more pronounced sorting of women into low-skilled occupations by ages 60-64. Our analysis shows that the changes in job retention rates cannot be solely explained by the changes in transitions to retirement. However, our findings further indicate that the countries that experienced job retention rate increases that are attributable not to individual-level factors (education, sector of employment, etc.), but to overall improvements (Poland, Czechia), were also the countries that increased their statutory retirement ages or reduced access to early retirement.

Retirement policies constitute an important, but not the only component of policy packages aimed at increasing job retention and employment among older workers. Future policies should address the gender specificity of labour outcomes among older workers, and place a larger emphasis on job retention among workers with primary education, especially in the agricultural and industrial sectors. The largest improvements in retention rates can be made among female workers, especially if the employment rates of prime-age women increase. To this end, public policy can be tailored to address the sorting of older women into elementary occupations (in which the chances of job retention are relatively low) by providing additional childcare facilities, by offering improved healthcare and in-house support for people with poor health (which would allow their family members to continue working), and by supporting remote work.

In all of the countries we studied, the low-skilled workers were the least likely to remain in their job after reaching pre-retirement age. Therefore, more emphasis needs to be placed on training and continuous learning for older workers. Policies aimed at improving the quality of jobs would also bring benefits to older workers and help them to work longer. Such actions may focus on promoting flexible working arrangements, part-time work, and gradual retirement. But these initiatives should also focus on improving workers' health, expanding preventive measures, and providing health checks. Finally, it is crucial that policies that shift retirement to later stages in life and policies that improve employability and job quality among older workers complement each other in a coherent and well-coordinated policy mix.

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Appendix A. OECD retention rates in other age groups

Table A1. OECD retention rates in 2003 and 2013, by country and age group

Age group	Czechia		Hungary		Poland		Slovakia	
	2003	2013	2003	2013	2003	2013	2006	2013
25-29	50%	55%	48%	55%	50%	45%	64%	47%
30-34	60%	57%	57%	51%	58%	54%	69%	56%
35-39	68%	68%	75%	63%	62%	62%	75%	69%
40-44	71%	77%	73%	59%	66%	66%	71%	73%
45-49	75%	74%	70%	72%	60%	68%	72%	72%
50-54	73%	82%	70%	73%	51%	70%	70%	72%
55-59	54%	64%	58%	56%	32%	63%	47%	65%
60-64	24%	31%	32%	20%	23%	41%	22%	27%

Note: Due to small sample sizes, the figures for Slovakia are reported for 2006 instead of 2003.
Source: Own calculations based on EU-LFS data, based on the OECD definition of retention rate.

Appendix B. OECD retention rates regressions on shares of pension benefit claimants

Table B1. Results of panel regressions explaining OECD retention rates by shares of pension (old-age, survivor, or disability) benefits claimants.

	55-64	55-59	60-64	55-64	55-59	60-64	55-64	55-59	60-64
	Both genders	Both genders	Both genders	Female	Female	Female	Male	Male	Male
Share of pension benefit claimants	-0.39*	-0.50*	-0.04	-0.48*	-0.56*	0.30	-0.18	-0.20	-0.16
Constant	0.65***	0.76***	0.30*	0.70***	0.75***	-0.05	0.56***	0.71**	0.41*
Within-country R2	0.09	0.14	0.00	0.22	0.36	0.03	0.01	0.01	0.03
Between-country R2	0.89	0.87	0.53	0.93	0.87	0.43	0.95	0.79	0.75
N	152	76	76	76	38	38	76	38	38

*Note: Regressions include fixed effects. The panel consists of four countries, with 11 observations for all countries except Slovakia (with eight observations). Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.*
Source: Own estimations based on the EU-LFS and EU-SILC data.

Appendix C. Bivariate probit second equation (non-retirement of people aged 60-64)

Table C1. Mean marginal effects of non-retirement from bivariate probit regression, people aged 60-64 working five years earlier

	Czechia		Hungary		Poland		Slovakia	
	Female	Male	Female	Male	Female	Male	Female	Male
Prob. employed 5 years before	0.27***	0.25***	-0.15***	0.00	0.11	0.07	0.05	0.06
Education:	*Base level: medium*							
Low	0.04***	-0.04**	-0.04***	-0.08***	-0.04**	-0.03***	0.00	-0.06***
High	0.03**	0.06***	0.09***	0.07***	0.14***	0.11***	0.04***	-0.00
Household (other people)[x]:	*Base level: living alone*							
One, E and NP	0.04***	0.02	0.04***	-0.07**	0.00	-0.04	-0.03*	0.10***
One, E and P	0.02**	0.12***	0.10***	0.08***	-0.01	0.09***	0.01	0.11***
One, NE and NP	0.02	0.07***	0.01	0.03	0.01	0.02	0.01	-0.01
One, NE and P	-0.07***	-0.09***	-0.08***	-0.10***	-0.10***	-0.09***	-0.04***	-0.09***
Two or more, E and NP	-0.02	-0.02	0.03	0.04	0.00	-0.12***	-0.01	-0.02
Two or more, E and P	0.07***	0.17***	0.08***	0.08***	0.03	0.09***	0.02	0.15***
Two or more, NE and NP	0.07***	-0.11***	0.07***	0.09***	0.00	-0.05*	-0.01	0.07*
Two or more, NE and P	-0.05***	0.00	-0.01	-0.01	-0.07***	-0.05***	-0.04***	0.02
Occupation (ISCO):	*Base level: ISCO 5. Service, shop and market sales workers*							
1. Managers	0.06***	0.09***	-0.03**	-0.03**	-0.01	-0.06***	0.05***	0.07***
2. Professionals	0.04***	0.06***	-0.02	0.02	-0.01	-0.04*	0.00	0.08***
3. Technicians and (…)	0.02**	0.02	-0.04***	-0.05***	0.02	-0.11***	-0.01	-0.03**
4. Clerical support workers	0.02	-0.01	-0.06***	-0.07***	-0.02	-0.06***	-0.00	-0.02
6. Skilled agricultural, (…)	0.00	-0.01	-0.04	-0.05**	0.08	-0.16***	-0.11**	-0.01
7. Craft and related (…)	-0.04**	-0.03*	-0.02	-0.07***	-0.09***	-0.18***	-0.02	-0.05***
8. Plant and machine (…)	-0.02	-0.03	-0.00	-0.05***	-0.11***	-0.24***	-0.01	-0.04***
9. Elementary occupations	0.02*	-0.01	0.05***	0.03**	0.04**	0.00	-0.02*	-0.00
Sector (NACE):	*Base level: G-N. Services*							
A. Agriculture	-0.06***	-0.03**	0.00	-0.02*	-0.04	0.02	-0.03	-0.09***
B-F. Industry	-0.04***	-0.03***	-0.05***	-0.04***	-0.06***	-0.04***	-0.07***	-0.02**
O. Public	0.04***	-0.02	0.00	0.00	-0.02	0.07***	-0.00	0.03*
P. Education	-0.03***	-0.01	-0.06***	0.01	-0.07***	-0.05***	-0.00	-0.01
Q. Health	0.03***	0.05**	0.03***	0.05***	0.02	0.11***	0.04***	0.03
R-U. Other	0.05***	0.08***	0.06***	0.09***	0.06***	0.15***	0.02	0.04
Year:	*Base level: 2003*							
2004	-0.01	0.04*	0.06*	0.02	-0.14***	-0.13***	-0.09**	0.10***
2005	0.01	0.10***	0.01	0.01	-0.19***	-0.13***	-0.03	0.15***
2006	-0.00	0.10***	-0.03	0.00	-0.26***	-0.18***	-0.05*	0.16***
2007	-0.01	0.11***	-0.01	0.01	-0.30***	-0.13***	-0.01	0.19***
2008	-0.03	0.15***	-0.05*	-0.04*	-0.25***	-0.16***	-0.01	0.25***
2009	-0.04**	0.15***	-0.08***	-0.05***	-0.21***	-0.24***	-0.03	0.23***
2010	0.02	0.14***	-0.08***	-0.05***	-0.21***	-0.22***	-0.00	0.24***
2011	0.00	0.13***	-0.07**	-0.03	-0.19***	-0.15***	-0.00	0.23***
2012	0.01	0.16***	-0.07***	-0.04*	-0.17***	-0.09**	-0.03	0.27***
2013	0.03	0.20***	-0.05**	0.05**	-0.17***	-0.04	0.02	0.25***
Observations	29,976	42,107	32,315	37,930	20,132	30,834	9,961	20,380

*Note: Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.*

[x] E stands for "all employed", NE for "somebody non-employed", P for "with partner", and NP for "without partner".

Source: Own estimations based on the EU-LFS data.

Appendix D. Bivariate probit results for the age group 55-59

Table D1. Mean marginal effects of retention from bivariate probit regression, people aged 55-59 working five years earlier

	Czechia		Hungary		Poland		Slovakia	
	Female	Male	Female	Male	Female	Male	Female	Male
Prob. employed 5 years before	0.16***	0.09*	-0.02	0.34***	-0.06	0.09	0.32***	0.25***
Education:	*Base level: medium*							
Low	-0.03***	-0.05***	-0.04***	0.01*	-0.02*	-0.05***	-0.01	-0.00
High	0.06***	-0.01	0.09***	-0.04***	0.12***	-0.06***	0.05***	-0.03**
Household (other people)[x]:	*Base level: living alone*							
One, E and NP	0.01	0.03	0.07***	0.06***	0.02	0.07**	-0.02*	-0.05
One, E and P	0.04***	0.09***	0.09***	0.10***	0.04***	0.09***	0.03**	0.06***
One, NE and NP	0.02	-0.01	0.01	0.01	-0.00	-0.01	-0.02	-0.13***
One, NE and P	-0.10***	0.03***	-0.06***	0.01	-0.04***	0.05***	-0.12***	-0.05***
Two or more, E and NP	0.05**	0.06	0.02	0.16***	0.03	0.05	-0.10***	0.04
Two or more, E and P	0.09***	0.11***	0.13***	0.12***	0.08***	0.13***	0.04***	0.04***
Two or more, NE and NP	0.07***	0.03	0.01	-0.02	0.02	-0.01	-0.07***	-0.13***
Two or more, NE and P	-0.02**	0.06***	0.02**	0.06***	0.02*	0.09***	-0.07***	-0.01
Occupation (ISCO):	*Base level: ISCO 5. Service, shop and market sales workers*							
1. Managers	0.22***	0.29***	0.13***	0.20***	0.20***	0.34***	0.15***	0.17***
2. Professionals	0.23***	0.29***	0.12***	0.30***	0.12***	0.35***	0.12***	0.28***
3. Technicians and (…)	0.19***	0.25***	0.09***	0.17***	0.13***	0.26***	0.08***	0.18***
4. Clerical support workers	0.13***	0.17***	0.07***	0.16***	0.09***	0.22***	0.04***	0.08***
6. Skilled agricultural, (…)	-0.07***	0.09***	-0.05**	-0.04**	-0.01	0.01	-0.02	-0.03
7. Craft and related (…)	0.02	0.17***	-0.01	0.08***	-0.04***	0.11***	-0.02	0.11***
8. Plant and machine (…)	0.07***	0.16***	-0.03***	0.07***	0.00	0.16***	0.03**	0.11***
9. Elementary occupations	-0.08***	-0.03*	-0.05***	-0.10***	0.02*	-0.01	-0.04***	-0.08***
Sector (NACE):	*Base level: G-N. Services*							
A. Agriculture	0.04**	0.11***	0.02	0.12***	0.00	0.04***	-0.03*	0.04***
B-F. Industry	-0.03***	0.01	-0.01	-0.00	-0.02***	-0.01*	-0.06***	-0.03***
O. Public	0.10***	-0.04***	0.05***	-0.08***	0.16***	0.02*	0.10***	-0.13***
P. Education	0.11***	0.07***	0.14***	0.16***	0.09***	0.08***	0.10***	0.08***
Q. Health	0.08***	0.04**	0.09***	0.09***	0.09***	0.11***	0.09***	0.05**
R-U. Other	0.06***	0.00	0.07***	0.05***	0.13***	0.13***	0.06***	-0.11***
Year:	*Base level: 2003*							
2004	0.02	0.01	0.07***	-0.03	-0.18***	-0.18***	0.01	-0.04
2005	0.05***	0.04***	0.06***	0.01	-0.18***	-0.15***	0.08***	-0.02
2006	0.06***	0.03**	0.06***	0.03**	-0.17***	-0.08***	0.13***	0.00
2007	0.08***	0.02	0.02	0.03	-0.17***	-0.03	0.18***	0.05**
2008	0.11***	0.04***	-0.02	-0.02	-0.16***	0.02	0.23***	0.04*
2009	0.13***	0.02	-0.00	0.02	-0.13***	0.02	0.29***	0.07***
2010	0.15***	0.02	0.07***	0.00	-0.06***	0.03	0.29***	0.03
2011	0.19***	0.05***	0.10***	0.02	0.01	0.04*	0.33***	0.04*
2012	0.18***	0.04**	0.08***	0.01	0.08***	0.05**	0.37***	0.03
2013	0.23***	0.07***	0.08***	0.03*	0.13***	0.05**	0.41***	0.04*
Observations	58,137	48,888	70,496	59,618	53,240	51,244	30,370	25,942

*Note: Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.*

[x] E stands for "all employed", NE for "somebody non-employed", P for "with partner", and NP for "without partner".

Source: Own estimations based on the EU-LFS data.

Table D2. Mean marginal effects of non-retirement from bivariate probit regression, people aged 55-59 working five years earlier

	Czech		Hungary		Poland		Slovakia	
	Female	Male	Female	Male	Female	Male	Female	Male
Prob. employed 5 years before	0.07	0.13***	-0.29***	0.07***	0.02	0.09***	0.22***	0.00
Education:	*Base level: medium*							
Low	-0.04***	0.03***	-0.07***	0.01*	-0.02	0.03***	-0.01	-0.01
High	0.10***	0.01	0.14***	-0.02**	0.13***	-0.04***	0.09***	-0.04***
Household (other people) [x]*:*	*Base level: living alone*							
One, E and NP	0.00	-0.01*	0.04***	0.03*	0.03*	0.01	-0.02	-0.04***
One, E and P	0.02***	0.01**	0.08***	0.03***	0.02**	0.01	0.04***	-0.00
One, NE and NP	0.02	0.03***	-0.02	0.05***	-0.02	0.02*	0.08***	0.00
One, NE and P	-0.14***	-0.01***	-0.09***	-0.02***	-0.08***	-0.02***	-0.14***	-0.04***
Two or more, E and NP	0.02	0.04	-0.02	-0.01	0.01	-0.03*	-0.10***	0.01
Two or more, E and P	0.07***	0.03***	0.11***	0.03***	0.07***	0.01	0.04***	-0.00
Two or more, NE and NP	0.06***	0.00	0.00	-0.02	0.02	-0.01	-0.05***	0.04**
Two or more, NE and P	-0.05***	0.01**	-0.01	0.02***	-0.02*	-0.01	-0.06***	-0.01*
Occupation (ISCO):	*Base level: ISCO 5. Service, shop and market sales workers*							
1. Managers	0.11***	0.06***	0.01	-0.02**	0.02	0.08***	0.06***	0.06***
2. Professionals	0.14***	0.04***	-0.01	0.04***	-0.06***	0.06***	0.03**	0.10***
3. Technicians and (…)	0.10***	0.04***	-0.01	-0.00	-0.04***	0.03***	-0.02**	0.04***
4. Clerical support workers	0.06***	0.04***	-0.02*	-0.01	-0.05***	0.04***	-0.04***	0.06***
6. Skilled agricultural, (…)	-0.06**	0.03**	0.02	0.03*	-0.02	-0.03*	-0.04	0.03**
7. Craft and related (…)	-0.01	0.03***	0.03**	-0.01	-0.06***	0.04***	-0.05***	0.05***
8. Plant and machine (…)	0.04***	0.03***	0.01	-0.05***	-0.07***	0.02***	0.02	0.04***
9. Elementary occupations	-0.05***	0.03***	0.02***	0.02*	0.06***	0.07***	-0.02**	0.04***
Sector (NACE):	*Base level: G-N. Services*							
A. Agriculture	-0.05***	0.02**	-0.01	0.04***	-0.00	-0.01	-0.05***	0.01
B-F. Industry	-0.05***	-0.02***	-0.03***	0.02***	-0.03***	-0.02***	-0.01	-0.01***
O. Public	0.07***	-0.05***	0.02*	-0.02**	0.08***	-0.06***	0.13***	-0.06***
P. Education	0.02*	-0.01	0.03***	0.09***	-0.04***	-0.07***	0.05***	0.03***
Q. Health	0.05***	0.02*	0.02***	0.03***	0.06***	0.01	0.09***	0.08***
R-U. Other	0.04**	0.01*	0.04***	0.05***	0.12***	0.03**	0.10***	-0.02*
Year:	*Base level: 2003*							
2004	0.04**	0.00	0.07***	-0.01	-0.19***	-0.04***	0.01	-0.01
2005	0.07***	0.01*	0.12***	0.02**	-0.20***	-0.03**	0.06***	-0.03**
2006	0.09***	0.01**	0.11***	0.06***	-0.27***	-0.03**	0.10***	-0.06***
2007	0.11***	0.01**	0.07***	0.06***	-0.26***	-0.00	0.16***	-0.06***
2008	0.16***	0.02***	0.04***	0.02***	-0.23***	0.01	0.24***	-0.06***
2009	0.18***	0.02***	0.07***	0.05***	-0.18***	0.01	0.31***	-0.05***
2010	0.21***	0.03***	0.18***	0.06***	-0.10***	0.01	0.34***	-0.04***
2011	0.26***	0.04***	0.23***	0.07***	0.00	0.02	0.37***	-0.03**
2012	0.25***	0.05***	0.19***	0.08***	0.11***	0.01	0.47***	-0.02
2013	0.31***	0.03***	0.20***	0.14***	0.21***	0.01	0.54***	-0.02
Observations	58,137	48,888	70,496	59,618	53,240	51,244	30,370	25,942

*Note: Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.*

[x] *E stands for "all employed", NE for "somebody non-employed", P for "with partner", and NP for "without partner".*

Source: Own estimations based on the EU-LFS data.

Appendix E. OECD retention rates and modelled retention rates among 60-64-year-olds

Figure E1. OECD retention rates and modelled retention rates among 60-64-year-olds

Source: Own calculations based on regressions from Table 4 and EU-LFS data, based on the OECD definition of retention rate.

Table E1. Correlations between the retention rates from the model and the OECD retention rates

	Czechia	Hungary	Poland	Slovakia
Female	85%	98%	84%	51%
Male	97%	91%	72%	92%

Source: Own calculations based on regressions from Table 4 and EU-LFS data, based on the OECD definition of retention rate. Correlations without outlying predictions for the year 2003 in Poland, resulting mainly from missing data lowering the sample size in that year (if included: 6% for women and 12% for men).

Appendix F. Bivariate probit results for the age group 60-64, with wages

Table F1. Marginal effects for retention from bivariate probit regression, people aged 60-64 and working five years earlier, with imputed wages

	Czechia		Hungary		Poland		Slovakia	
	Female	Male	Female	Male	Female	Male	Female	Male
Prob. employed 5 years before	0.19***	0.26***	-0.02	0.04	0.06	0.03	0.10**	0.17***
Wage:	*Base level: 5th decile*							
1st decile	0.18***	0.13***	0.14***	0.10***	0.36***	0.29***	0.04**	0.02
2nd decile	0.02*	0.03*	-0.07***	-0.10***	0.06***	0.13***	-0.02	0.09***
3rd decile	0.05***	-0.12***	-0.03**	-0.15***	0.30***	0.15***	0.02	-0.04***
4th decile	0.03***	-0.02	-0.04***	-0.03***	0.28***	0.01	-0.08***	-0.03***
6th decile	0.09***	0.14***	0.07***	-0.01	-0.01	-0.04***	0.05***	0.02**
7th decile	0.13***	0.21***	0.06***	-0.03***	0.16***	0.28***	0.12***	0.07***
8th decile	0.21***	0.25***	0.26***	0.01	0.21***	0.40***	0.20***	0.20***
9th decile	0.25***	0.19***	0.25***	0.07***	0.55***	0.39***	0.31***	0.18***
10th decile	0.25***	0.33***	0.37***	0.14***	0.49***	0.62***	0.22***	0.18***
Education: Low	0.04***	-0.04***	-0.03***	-0.06***	-0.03**	-0.05***	-0.03*	-0.06***
Education: High	0.01	0.03**	0.04***	0.05***	0.02	0.01	-0.04**	0.03**
Household (other people)x:	*Base level: living alone*							
One, E and NP	0.02*	0.02	0.04***	0.01	0.01	0.03	0.01	0.10***
One, NE and NP	0.01	0.04	-0.02	0.04**	0.01	-0.09***	0.00	0.05*
Two or more, E and NP	-0.02	0.03	0.02	0.10***	0.01	0.06*	-0.03	0.03
Two or more, NE and NP	0.05**	-0.11***	0.02	0.02	-0.00	-0.01	-0.03	-0.04
One, E and P	0.02**	0.11***	0.06***	0.10***	0.00	0.07***	0.05***	0.13***
One, NE and P	-0.06***	-0.04***	-0.07***	-0.03***	-0.03***	-0.01	-0.04***	-0.03**
Two or more, E and P	0.06***	0.16***	0.05***	0.10***	0.04***	0.09***	0.04**	0.16***
Two or more, NE and P	-0.03***	0.03**	-0.01	0.03***	-0.01	0.03**	-0.03**	0.04***
Occupation (ISCO):	*Base level: ISCO 5. Service, shop and market sales workers*							
1. Managers	-0.09***	-0.04*	-0.18***	-0.09***	0.00	-0.18***	-0.02	-0.07***
2. Professionals	0.01	-0.04*	-0.10***	-0.11***	0.06***	-0.12***	0.06***	-0.04*
3. Technicians and (…)	-0.00	0.01	-0.02**	-0.09***	0.10***	-0.02	0.03*	-0.06***
4. Clerical support workers	0.01	0.03	-0.04***	-0.10***	0.13***	0.08***	-0.03**	0.04**
6. Skilled agricultural, (…)	-0.14***	-0.06**	-0.13***	-0.00	-0.17***	-0.35***	-0.14***	0.02
7. Craft and related (…)	-0.06***	0.03	-0.01	-0.09***	-0.14***	0.01	-0.13***	-0.04***
8. Plant and machine (…)	-0.03**	0.00	-0.12***	-0.06***	-0.05*	-0.04***	-0.00	-0.04***
9. Elementary occupations	-0.03***	-0.03	0.02*	-0.03**	-0.02**	-0.02*	-0.02	-0.00
Sector (NACE):	*Base level: G-N. Services*							
A. Agriculture	-0.03*	-0.00	-0.02	-0.03***	-0.07***	0.05***	-0.01	-0.06***
B-F. Industry	-0.03***	-0.03***	-0.06***	-0.03***	-0.02***	-0.01	-0.05***	-0.02**
O. Public	0.04***	-0.03**	-0.06***	-0.04***	0.00	0.07***	-0.03*	0.01
P. Education	0.02**	0.06***	0.00	0.09***	0.04***	0.17***	0.00	0.09***
Q. Health	0.03***	0.02	0.03***	0.07***	0.03***	0.15***	0.04***	0.05***
R-U. Other	0.05***	0.07***	0.03**	0.10***	0.03**	0.13***	0.10***	0.04**
Year:	*Base level: 2003*							
2004	0.01	0.00	0.00	-0.00	-0.02	-0.09***	-0.12**	0.10***
2005	0.01	0.06***	-0.02	-0.00	-0.04	-0.09***	-0.05	0.16***
2006	0.01	0.07***	-0.06***	-0.02	-0.04	-0.08***	-0.02	0.16***
2007	0.00	0.09***	-0.04*	-0.03*	-0.04	-0.05**	0.04	0.20***
2008	0.00	0.10***	-0.07***	-0.05***	-0.05*	-0.09***	0.04	0.26***
2009	0.00	0.08***	-0.10***	-0.08***	-0.02	-0.09***	0.02	0.25***
2010	-0.02	0.07***	-0.12***	-0.07***	0.01	-0.07**	0.05	0.24***
2011	-0.03	0.04**	-0.11***	-0.06***	0.05*	-0.00	0.01	0.23***
2012	-0.02	0.08***	-0.11***	-0.07***	0.04	0.03	-0.02	0.25***
2013	0.04**	0.12***	-0.09***	-0.01	0.06**	0.06**	0.04	0.24***
Observations	29,865	41,903	32,223	37,800	19,967	30,821	9,313	19,978
Corr. - residuals of equations	0.86	0.93	0.90	0.92	0.88	0.83	0.85	0.92

*Note: Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1*

x E stands for "all employed", NE for "somebody non-employed", P for "with partner", and NP for "without partner".

Source: Own estimations based on the EU-LFS data.

Table F2. Marginal effects for non-retirement from bivariate probit regression, people aged 60-64 working five years earlier, with imputed wages

	Czechia		Hungary		Poland		Slovakia	
	Female	Male	Female	Male	Female	Male	Female	Male
Prob. employed 5 years before	0.27***	0.23***	-0.16***	-0.00	-0.04	0.03	-0.00	0.04
Wage:	*Base level: 5th decile*							
1st decile	0.12***	0.08***	0.15***	0.13***	0.41***	0.27***	0.02	0.03
2nd decile	0.01	0.01	-0.08***	-0.11***	0.06***	0.11***	-0.02**	0.03
3rd decile	0.02*	-0.11***	-0.04***	-0.18***	0.36***	0.17***	0.02*	-0.03**
4th decile	0.03**	-0.02**	-0.02	-0.03***	0.31***	0.04***	-0.04***	-0.04***
6th decile	0.14***	0.14***	0.08***	-0.02*	-0.01	-0.04***	0.03**	0.01
7th decile	0.09***	0.22***	0.07***	-0.04**	0.18***	0.26***	0.08***	0.06***
8th decile	0.21***	0.27***	0.29***	0.04**	0.24***	0.37***	0.11***	0.24***
9th decile	0.25***	0.21***	0.26***	0.11***	0.75***	0.39***	0.27***	0.20***
10th decile	0.25***	0.37***	0.43***	0.22***	0.63***	0.70***	0.12***	0.20***
Education: Low	0.05***	-0.03**	-0.03***	-0.07***	-0.02*	-0.03***	-0.01	-0.05***
Education: High	0.00	0.02*	0.07***	0.02**	0.08***	0.07***	0.03*	0.00
Household (other people)[x]:	*Base level: living alone*							
One, E and NP	0.03**	0.03	0.04***	-0.06**	0.01	-0.03	-0.02	0.12***
One, NE and NP	0.01	0.08***	-0.00	0.05**	-0.02	0.04	0.02	0.01
Two or more, E and NP	-0.03	-0.03	0.01	0.03	0.04**	-0.11***	-0.00	0.00
Two or more, NE and NP	0.06***	-0.12***	0.06***	0.10***	0.01	-0.04	-0.01	0.08**
One, E and P	0.02*	0.12***	0.08***	0.08***	-0.02	0.06***	0.02*	0.11***
One, NE and P	-0.06***	-0.07***	-0.07***	-0.09***	-0.07***	-0.09***	-0.04***	-0.08***
Two or more, E and P	0.07***	0.16***	0.08***	0.08***	0.02	0.06***	0.02	0.16***
Two or more, NE and P	-0.04***	0.01	-0.01	-0.01	-0.05***	-0.06***	-0.04***	0.02
Occupation (ISCO):	*Base level: ISCO 5. Service, shop and market sales workers*							
1. Managers	-0.13***	-0.13***	-0.26***	-0.14***	-0.12***	-0.33***	-0.00	-0.11***
2. Professionals	-0.02	-0.12***	-0.16***	-0.15***	-0.05***	-0.28***	-0.02	-0.08***
3. Technicians and (…)	-0.05***	-0.07***	-0.10***	-0.12***	0.03*	-0.13***	-0.01	-0.12***
4. Clerical support workers	-0.01	-0.06**	-0.09***	-0.12***	0.07***	-0.01	-0.02	0.00
6. Skilled agricultural, (…)	-0.07**	-0.06*	-0.10***	0.00	-0.28***	-0.46***	-0.13***	-0.05
7. Craft and related (…)	-0.07***	-0.04**	-0.03	-0.09***	-0.21***	-0.05***	-0.06*	-0.07***
8. Plant and machine (…)	-0.03**	-0.06***	-0.12***	-0.05***	-0.05	-0.15***	0.04	-0.06***
9. Elementary occupations	0.00	0.01	0.04***	0.04***	-0.02*	0.00	-0.03**	0.01
Sector (NACE):	*Base level: G-N. Services*							
A. Agriculture	-0.06***	-0.02*	-0.02	-0.01	-0.11***	0.01	-0.02	-0.10***
B-F. Industry	-0.02***	-0.02***	-0.06***	-0.04***	-0.05***	-0.04***	-0.07***	-0.01
O. Public	0.03***	-0.04**	-0.04***	-0.01	-0.03**	0.02	-0.01	0.04**
P. Education	-0.01	0.03	-0.03***	0.08***	-0.01	0.03**	0.01	0.04**
Q. Health	0.02*	0.05**	0.04***	0.05***	0.02	0.06**	0.03***	0.02
R-U. Other	0.04***	0.08***	0.04***	0.09***	0.01	0.11***	0.02	0.06***
Year:	*Base level: 2003*							
2004	0.01	0.04*	0.06**	0.02	-0.08**	-0.08**	-0.08**	0.10***
2005	0.02	0.09***	0.02	0.02	-0.14***	-0.09**	-0.05*	0.14***
2006	0.01	0.09***	-0.01	0.01	-0.23***	-0.14***	-0.07**	0.14***
2007	-0.00	0.11***	0.01	0.01	-0.25***	-0.11***	-0.03	0.18***
2008	-0.01	0.14***	-0.01	-0.02	-0.21***	-0.16***	-0.02	0.24***
2009	-0.02	0.13***	-0.04	-0.05**	-0.18***	-0.21***	-0.04	0.21***
2010	0.03**	0.13***	-0.05*	-0.05**	-0.18***	-0.19***	-0.01	0.23***
2011	0.01	0.07***	-0.02	-0.03	-0.14***	-0.11***	-0.02	0.22***
2012	0.02	0.11***	-0.02	-0.04*	-0.14***	-0.05	-0.05*	0.26***
2013	0.05***	0.16***	0.00	0.05***	-0.12***	-0.01	0.00	0.25***
Observations	29,865	41,903	32,223	37,800	19,967	30,821	9,313	19,978

*Note: Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.*

[x] E stands for "all employed", NE for "somebody non-employed", P for "with partner", and NP for "without partner".

Source: own estimations based on the EU-LFS data.

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