Policy Research Working Paper 10205

Explaining the Evolution of Job Tenure in Europe, 1995–2020

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WORLD BANK GROUP
Europe and Central Asia Region
Office of the Chief Economist
October 2022

Policy Research Working Paper 10205

Abstract

During the last quarter century, job tenure in Europe has shortened. Using data from Eurostat Labor Force Surveys of 29 countries from 1995 to 2020 and applying an age-period-cohort decomposition to analyze changes in tenure for specific birth cohorts, this paper shows that tenure has shrunk for cohorts born in more recent years. To account for compositional changes within cohorts, the analysis estimates the probability of holding jobs of different durations, conditional on individual and employment-related characteristics. The estimations demonstrate that, over time, the likelihood of having a medium- or long-term job decreased and holding a short-term job increased. The paper also finds that stricter job protection legislation appears to decrease the probability of holding a short-term job, and higher trade openness and ICT-related technological change are correlated with an increase of that probability.

This paper is a product of the Office of the Chief Economist, Europe and Central Asia Region. It is part of a larger effort by the World Bank to provide open access to its research and make a contribution to development policy discussions around the world. Policy Research Working Papers are also posted on the Web at http://www.worldbank.org/prwp. The authors may be contacted at mbussolo@worldbank.org, dcapelle@imf.org, mlokshin@worldbank.org, itorre@worldbank.org, and hernanwinkler@gmail.com.

Explaining the Evolution of Job Tenure in Europe, 1995-2020

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Keywords: job tenure, employment, labor maker, labor legislation, trade openness, Europe.

JEL: J44, J60, O33

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1. Introduction

This paper analyzes the evolution of job tenure in Europe from 1995 to 2020. The focus on job tenure is motivated by two sets of arguments: one related to wellbeing and equity issues, and the other related to efficiency.

The first set of arguments considers the length of job tenure as a key measure of job stability (Neumark 2000) and, in turn, job stability as one of the main drivers of job satisfaction and workers' wellbeing (Clark, Knabe, and Rätzel 2010; Origo and Pagani 2009). Long-lasting tenure is particularly relevant in Europe, where the idea of a "job for life" was part of its citizens' collective identity in the second half of the 20th century. In fact, many Europeans still set their expectations with that ideal job as their primary reference point,[1] even if fundamental changes in labor markets since the 1970s broke the implicit contract of long-term commitment between employers and workers (Stone 2004). Concerns about an increase in job instability have been highlighted by Hollister (2011) and Standing (2011), among others, even if, as Manning and Mazeine (2022) report, there is not much hard evidence on the *objective* measures of job instability and its long term trends[2] and it is not clear that even *subjective* indicators point to a worsening situation.[3] In terms of equity, even if at the aggregate average level, tenure has not changed much, some groups may experience a shrinking of their tenure. This uneven incidence of shorter job tenures could be a potential reason behind tensions in Europe's social contracts (Bussolo and others 2018).

The second set of arguments motivating a study on the evolution of job tenure points out that, beyond being an indicator of job stability, tenure also reflects the efficiency of the job search process (Pries and Rogerson 2022). When workers and employees are satisfied with the job match, only a strong shock can sever the employment relationship, but bad job matches are more prone to dissolve quickly. Changes in the average length of job tenure can then indicate changes in how good job matches are on average in the economy. Tenure is also important for human capital

[1] According to data from the 2015 round of the International Social Survey Programme, 59 percent of European respondents considered job security a "very important" and 33 percent considered it an "important" attribute of a job (ISSP 2017).
[2] Some papers have focused on documenting the heterogeneity in *levels* of tenure, but fewer have analyzed the time *trends* of tenure (see infra the literature review section for more details).
[3] Manning and Mazeine (2022) find that in the US, UK and Germany, subjective perceptions of the probability of job loss have remained stable over the past 30 years. They find some differences in perceptions between subgroups of the population, but there are no substantial differences in trends over time. Note also that Molloy, Smith and Wozniak (2021) show that subjective perceptions of job stability can be more aligned with changes in short tenure jobs than in long tenure jobs.

investment decisions (Baum 2022), as firms often train workers in firm-specific tasks, and workers themselves gain tacit and firm-specific knowledge the longer they are employed in a given job – which in turn makes them more productive. The relationship between tenure and productivity may not, however, be linear and, in fact, it may plateau at very long tenure values (Gagliardi, Grinza and Rycx 2022). Finally, from a household perspective, changes in job tenure also impact wealth accumulation. Households with more stable jobs -i.e., longer-tenured jobs- accumulate more wealth even when controlling for income (Kuhn and Ploj 2020). This effect grows with age, and workers who start their careers in unstable jobs see their whole life-cycle wealth accumulation affected. Analyzing the evolution of job tenure can thus be informative about changes in the labor market and also provide indications of the expected evolution of household welfare.

Motivated by these arguments, this paper first main objective is to provide an accurate assessment of the evolution of job stability, measured by changes in job tenure, across generations in Europe. The analysis is based on data from the Eurostat Labor Force Surveys (EU–LFS) on 29 European countries over the period 1995–2020 (Eurostat 2021)[4].

The initial assessment is that job tenure has shrunk for workers from more recently born cohorts. For example, a worker born in 1980 has, on average, 3.6 years shorter tenure than a worker born in the 1940s. This result is obtained using an age-period-cohort decomposition of the group-level trends in job tenure, controlling for lifecycle changes and aggregate labor market shocks that are common across age cohorts.

This result is also confirmed when we model the duration of tenure at the individual level to account for changes in the labor market that might affect the composition of characteristics within the cohorts. We estimate the probability of having a job of three lengths of tenure—short, medium, and long—conditional on a set of individual characteristics (such as age, gender, and education) and employment-related characteristics (such as occupation and the size of the firm). After controlling for these characteristics, the probability of having a medium- or long-term job declined and having a short-term job increased over the survey period. The probability of having a short-term job

[4] We replicated the analysis presented in this paper on a sample that excludes data from the 2020 EU-LFS. Our concern was that the COVID-19 pandemic and the non-pharmaceutical interventions implemented by EU governments had such a profound impact on the EU economies and labor markets that 2020 could be an outlier in tenure trends and other dimensions we study in this paper (see Demirguc-Kunt et al. 2021). However, the results of these estimations are qualitatively very similar to the results based on the 1995 – 2020 sample. (These results are available from the authors on request.)

increased by 0.12 percentage points a year, resulting in the growth of the probability of holding a short-term job between 1995 and 2020 by 2.98 percentage points. The share of short-term jobs increased more rapidly for women, youth, and people with higher education. It remained unchanged among people with lower education levels, among whom the probability of having a medium- or long-term job declined more rapidly. The results we find in our sample of European countries stand partly in contrast with those observed in the United States, where the prevalence of short tenure jobs seems to have declined over time (Molloy, Smith and Wozniak 2021, Pries and Rogerson 2022).

The second objective of our paper is to assess the impact of three potential drivers of this persistent decline in job tenure in Europe: changes in job protection legislation, trade openness, and technological change.

Modern technologies and international competition might require employers and employees to be more flexible and have spurred concerns about the potential decline in the prevalence of long-term jobs (Bachmann and Fedler 2018). Firms need to be more agile to adapt to rapidly evolving demands for new products and services; workers must adapt to frequent transitions between jobs. Flexible and temporary contracts allow firms to adjust their workforces to changes in the economic environment. Such contracts also offer firms opportunities to hire workers with uncertain productivity. Flexible contracts are less attractive to workers, however, as wages and investments in training are lower than they are in permanent contracts (Fouarge and others 2012).[5] This problem is especially acute in Europe, where the aging population weakens the adaptability of the workforce to labor market shocks, as retraining and mobility are less profitable for older workers (Cörvers, Euwals, and De Grip 2012).

Our analysis shows that stricter job protection policies are associated with a lower probability of having short-term jobs and that trade openness is associated with a significant increase in that probability. Our estimations suggest a positive impact of technological progress and innovation on the likelihood of short-term jobs, although these results should be interpreted with caution, given the smaller sample size for this indicator.

[5] Temporary contracts could be seen as stepping stones for the permanent employment. However, the evidence from EU countries indicates that this is true only for recent university graduates (Bertrand-Cloodt and others 2012).

The implications of our findings are multiple. The decline in job tenure for younger cohorts suggests that the job search process may be becoming more inefficient, particularly for first job matches, as individuals repeatedly change jobs in the first years of professional life (Baum 2022). This may, in turn, negatively affect the long-term accumulation of wealth and human capital of Europe's younger generations. To the point that changes in employment protection legislation appear to be associated with the increased prevalence of short tenure jobs, it begs the question of whether these changes, which in many cases were implemented to improve the dynamism of local labor markets, may have resulted in a noisier job search and matching process.

Our paper contributes to the literature on changes in European labor markets over the last three decades by focusing on the understudied subject of job tenure. It decomposes the evolution of job tenure in age and cohort effects using the most recent data, controlling for compositional changes in the labor market, including aging, a significant characteristic of the labor force in Europe. It is among the first studies to test a series of hypotheses that could explain the secular decline in job tenure in Europe between 1995 and 2020.

The paper is organized as follows. The following section reviews the recent literature on tenure trends in Europe and factors determining changes in cohort tenure dynamics. Section 3 describes the data and presents descriptive statistics. Section 4 presents the results of the APC decomposition of tenure dynamics. Section 5 discusses the results of the individual-level analysis of tenure trends. Section 6 identifies the main drivers of labor market changes in Europe. Section 7 summarizes the paper's main findings.

2. Literature review

The literature on tenure includes several strands. The first, focusing mainly on Europe, looks at the demographic drivers of tenure: age and gender. The evidence suggests that mean tenure depends on the age structure of the working population, as younger workers have shorter tenure than older workers. Younger workers in Europe are often also more mobile. They have a higher turnover rate than older workers, as they look to accumulate different experiences and change jobs to seek better opportunities (Auer and Cazes 2000; Cazes and Tonin 2010; Burgess 1999; Weber and Luzzi 2014). Countries with younger populations (such as Ireland) have lower average tenures than countries with older populations (such as Italy) (Bachmann and others 2015).

With respect to gender, tenure is longer for men than for women, although this gap narrowed between 2000 and 2015 (Abraham, Spletzer, and Harper 2010; Auer and Cazes 2000; and Bachmann and others 2015). Similarly, in the United States, the median tenure for women has increased over time, while that of men -particularly older men- has decreased (Molloy, Smith and Wozniak 2021). The fact that women still have a lower mean tenure than men may be linked to women's participation in atypical and low-paid precarious jobs, as Ortiz, Díez, and Apaolaza (2020) show. They report higher participation of women in part-time jobs and temporary contracts, which allow women to balance work and family duties.

A smaller set of studies have looked at the effects of education on tenure. They reach no clear consensus. Burgess (1999) finds tenure to be similar across skill levels. Auer and Cazes (2000) show that low levels of education are associated with longer tenures in most countries in the European Union (EU).

Differences in job tenure across individuals have also been associated with the type of contracts they hold (temporary or permanent). Recent evidence suggests that temporary employment serves as a trap rather than a stepping stone to tenured contracts, creating dual labor markets and making mobility from temporary work toward open-ended contracts increasingly difficult (Fauser 2020, Kiersztyn 2021; Mattijssen and Pavlopoulos 2019; Reichenberg and Berglund 2019). Almost all temporary workers move into permanent jobs in Austria, Estonia, and Germany. However, half of all temporary workers in Spain and Italy remain in temporary jobs for more than a decade (Eichhorst, Marx, and Wehner 2017). The transition from fixed-term to permanent contracts is lower for foreign-born workers, who are more likely to work for longer periods on fixed-term contracts (Skedinger 2018).

Many papers study the relationship between job tenure and employment protection laws. Bachmann and Felder (2018) show that tenure is generally longer in countries with more regulated labor markets. Boeri (1999) argues that it is possible to have strict employment security regulations, significant job-to-job shifts, and high unemployment rates in these countries because employment security regulations can be enforced only by increasing the number of workers on short-term jobs, and these workers compete for jobs with unemployed job-seekers. Passaretta and Wolbers (2019) find that stronger protection of permanent employment raises the likelihood of employees remaining in temporary jobs instead of moving to permanent employment or unemployment.

Tenure varies along the business cycle, with the mean tenure rising during recessions (Bell and Blanchflower 2010, 2011a, 2011b). During economic downturns, short-tenured and temporary jobs are more likely to be eliminated than longer-tenured jobs (Rothstein 2021; Burgess and others 2003; Aslund and Rooth 2007). The exit flows of short-tenured workers, coupled with low rates of new jobs creations, increase the mean tenure (Bachmann and Felder 2018).

Changes in tenure can potentially be driven by changes in the general economic environment where firms operate. In this sense, technological change and increased competition from foreign firms may play an important role, just as they have played on other dimensions of the labor market. The emergence of new technologies, globalization, and trade openness changed the nature of the labor market demand and shifted production toward automated processes (Schmidpeter and Winter-Ebmer 2021). New technologies can perform routine tasks efficiently and leave room for value-added tasks that require high-skill workers (Graetz et al. 2022). Developed countries use this advantage to increase demand for skilled labor, displacing routine occupations and pushing low-skilled workers to lower-paid occupations or unemployment (Bauer and Bender 2004). Technological changes and globalization lead to "creative destruction" at a firm level that intensifies workers' reallocation and raises turnover rates (Greenan and Guellec 2000).

The response to technological changes and trade openness in the EU varied by country. Caroli and Van Reenen (2001) show that in France and the U.K., technological innovation reduced the demand for unskilled workers and decreases their wages. Brekelmans and Petropoulos (2020) analyze 24 EU countries from 2002 to 2016 and find evidence of a skill-biased technological change, favoring skilled workers in terms of employment stability and wages. A similar result is found by Arvanitis and Loukis (2015), who find that new technologies increase the demand for high-skill workers and decrease it for low-skill and medium-skill workers in Greece and Switzerland. Harrison et al. (2014) find that from 1998 to 2000, France, Germany, Spain, and the U.K. experienced a continual creation and destruction of jobs in the manufacturing and service sectors that compensate for the net employment growth rate, arguing that innovation does not imply an increase in the unemployment rate.

Trade openness, which has increased as countries in the European Union became more integrated not only between themselves but also with third countries, has had effects on the labor market. Madanizadeh and Pilvar (2019) analyze the impact of trade openness on the labor markets in 90 countries–38 of them in Europe–during 1990–2012 and find that trade openness increases labor force participation. Dauth et al. (2017) argue that increased trade openness with China and Eastern Europe from 1993 to 2004 allowed Germany to retain manufacturing jobs. Donoso et al. (2015) demonstrate that while Spanish provinces where Chinese imports grew faster experienced a significant decline in manufacturing employment, this decline was compensated by increasing employment in non-manufacturing sectors. Colantone (2012) shows that increased trade openness in the manufacturing sector resulted in job destruction and decreased employment growth in Belgium from 1996 to 2002. Arvanitis and Loukis (2015) report that in Switzerland, trade openness increased the demand for high-skill workers, destroyed employment for medium-skill workers and has no effect on low-skill workers. Balsvik et al. (2015) demonstrate that import competition from China from 1996 to 2007 explains almost 10% of the reduction in manufacturing employment in Norway. Low-skill workers are the most exposed to unemployment and non-participation in the labor market.

3. Data and Descriptive Statistics

Our main data set for the analysis of job tenure is the EU-LFS constructed by Eurostat (2021), based on the results of a large household survey that provides quarterly data on labor force participation by respondents older than 15. National statistical institutes in every EU country conduct these surveys, applying harmonized concepts and definitions, and Eurostat processes the results. This structure allows for cross-country comparisons. Beginning in the early 1990s, the survey covered Iceland, Norway, Switzerland, and the United Kingdom, in addition to members of the European Union. The sample size of the EU-LFS ranges from 4.5 million to 5.2 million observations, depending on the year.[6]

Because data on tenure are sparse before the mid-1990s, our sample is based on data for 1995–2020. We restrict it to workers between the ages of 20 and 65, as often done in the literature on job tenure (see, for example, Gregg and Wadsworth 2002 and Burgess and Rees 1998). We group countries into four regions: Western Europe, Northern Europe, Central Europe and the Baltic countries, and Southern Europe.[7]

[6] Our analysis does not include German data because Eurostat provides no data on Germany to non-EU researchers (Eurostat 2022).

[7] See table A.1, in the appendix, for a detailed description of the sample and the classification of countries. These groups correspond to the standard categorization used in the World Bank (World Bank 2022b).

We also use several auxiliary data sources. Data on trade openness (defined as the sum of the merchandise import and export shares in GDP) and real GDP per capita growth are from Eurostat and *World Development Indicators* (World Bank 2022a). Data on the capital stock of information and communication technology (ICT)—a proxy for technological change in a country—are from the KLEMS data set (Jorgenson 2012). Our measure of job protection corresponds to two Employment Protection Legislation (EPL) indices calculated by the OECD (2021). We use the index measuring the protection of regular workers from dismissal (EPR, version 1) and the index measuring the difficulty of hiring temporary workers (EPT, version 1). Both range from 0 to 5, with higher values corresponding to a higher degree of job protection (more difficult dismissal of regular workers and more difficult hiring of temporary workers). Table 1 presents descriptive statistics of the variables included in our empirical analysis.

Figure 1 displays average tenure over the sample period by subgroup. There is no clear trend; macroeconomic fluctuations seem to be driving most of the movement in these aggregate measures. The average worker in Europe spent about 10 years in his or her current job. There is some heterogeneity across regions of Europe, with workers in Southern Europe having, on average, job tenure that is two years longer than their peers in Northern Europe. This difference increased over time, as tenure in Northern Europe decreased while remaining stable in Southern Europe. Tenure in Central and Western Europe mainly remained stable, at 10 years, during the sample period.

Figure 2 shows the average tenure by cohort and age for all countries in the sample. As expected, it increases with age, stabilizing toward the end of an individual's working life. The age profiles of each cohort are not perfectly aligned. Profiles of younger cohorts tend to shift down, indicating the shortening of tenure for younger cohorts

Table 2 presents the average tenure by subgroup. Although the gap has shrunk, women have a shorter average tenure than men. In 1995, men had an average tenure of almost two years longer than women; by 2020, the difference was only 0.7 year. Workers with only a lower-secondary diploma have higher average tenure than those with an upper-secondary diploma or tertiary degree. However, workers with an upper-secondary diploma saw a slight increase in their average tenure, of about 0.7 year between 1995 and 2020. All age groups experienced a decrease in tenure, but the decrease was most significant for workers 40–49 (2.35 years). This difference is not surprising given the age-cohort profile observed in figure 2. The average tenure for workers with permanent contracts remained more or less stable, while the average tenure for workers with temporary contracts increased slightly.

These simple comparisons between means may mask the complex interactions of a range of factors affecting tenure trends. For example, in a society with an aging population, such as most countries in Europe, not accounting for changes in the age composition of the labor force understates the decline in tenure. Using the argument made by Ryder (1965), the analysis of tenure dynamics is complicated by the fact that workers of different age groups are at different stages of education, career, and family formation status; at various times, they are exposed to common shocks, such as recessions, wars, and pandemics; and successive cohorts experience different histories and types of socialization.

In the next section, we use an APC decomposition to estimate the change in tenure across cohorts of workers born in different years, controlling for the aging of the labor force and the macroeconomic shocks common to all workers. We then move to the individual-level analysis of changes in job tenure that might be obscured by offsetting changes in labor force composition within groups. We estimate the probability that workers have been in their job for a short, medium, or long time, controlling for a set of individual and employment characteristics, and use these estimates to analyze the trends in job tenure purged from the influence of these characteristics. We then investigate the driving forces behind the documented tenure dynamics, focusing on the effects of changes in employment protection regulations, technological change, and trade openness.

4. Age-Period-Cohort Decomposition

One of the main challenges in analyzing trends in economic choices and characteristics over the life cycle is to separately identify the variation caused by age, the variation associated with the time periods that affect all age groups, and cohort-level variation. A common approach to this challenge is the APC decomposition, which estimates the lifecycle profile of a variable (for instance, job tenure in our case), the effects of shocks common to all individuals and specific to a period, and the effects specific to each cohort. A cohort is defined as a group of individuals entering a system at the same time (for example, the year they were born or the year they enter the labor market); a period is defined as the time when the outcome is measured (for example, survey year); and age is the time since the system entry (for example, the time since a person was a born or entered the labor market).[8]

In the analysis of job tenure dynamics, period variation is associated with macro-level changes in the labor market. For example, introducing new job protection regulations would affect the job tenure of all current workers. Age variation reflects the evolution of job tenure with workers' age. Younger workers tend to have shorter tenure than older workers because they have been in the labor market for a shorter time. Cohort variation in tenure reflects the persistent effects of socioeconomic and environmental factors that produce differences in labor market outcomes for specific cohorts (Ryder 1965). For example, a cohort of workers that entered the labor market during a recession might have different labor market trajectories than similar workers who started their careers during periods of economic growth (Oreopoulos, Wachter, and Hei 2006).

The multicollinearity of the linear relation between age, period, and cohort requires two constraints to be imposed on the model parameters to achieve identification. A popular approach introduced by Deaton and Paxson (1994) assumes the period effects to be orthogonal to the age and cohort effects, implying that structural trends in the period effects are absorbed by the age and cohort effects.[9] An alternative approach is to use proxy variables that capture period or cohort effects. Heckman and Robb (1985) use variables that capture the business cycle effect as proxies for the period effects. The results based on both approaches are highly sensitive to the choice of constraints and proxy variables (Browning, Crawford, and Knoef 2012).[10]

The maximum entropy (ME) estimator generates a distribution of estimates that satisfies the linear constraints of the standard APC models and produces estimates of the expected values of parameters corresponding to the ME probability distribution (Browning, Crawford, and Knoef

[8] The APC method has been used in economics to investigate growth in savings and aging in Taiwan, China (Deaton and Paxson 1994). Blundell et al. (1998) and Tunali et al. (2019) relied on the APC approach to analyze the female labor supply in the United States and Türkiye. The age-wage profile of Italian households is studied by Jappelli (1999). Koning and Vethaak (2019) relied on APC to decompose the employment trends of disabled workers in OECD countries. The methodology was used by Queiroz and Ferreira (2021) to investigate the evolution of labor force participation and the expected length of retirement in Brazil. Bardazzi and Pazienza (2017) apply cohort analysis to study the role of changing generational preferences in the energy expenditure trends in Italy.

[9] Hanoch and Honing (1985) specify linear trends for age, cohort, and period and define the parameters of the APC model as deviations from the trends. They also assume no linear trend in the period effect. These restrictions are shown to be equivalent to those made by Deaton and Paxson (1994).

[10] The APC under-identification problem is an instance of a large class of structural under-identification problems that occur when conceptualization of the effects of structural arrangements leads to an exact linear dependency among the effect (for example, Duncan 1966).

2012). The criterion function used to select the probabilities corresponding to the coefficients of the APC model is the entropy measure by Shannon (1948) that is identified by requirements that any measure of uncertainty should be continuous, symmetric with respect to reordering of the outcomes, and additively decomposable, and bounded (which is the case for most demographic and economic data). An appealing feature of the APC ME method is that it overcomes the potential arbitrariness of identification restrictions. We use the ME estimator, but we compare our results to the estimates based on the approach by Deaton and Paxson (1994).[11]

We model the job tenure T_{iapc} of individual i as a linear function of the individual's age (a_i), period (p_i), and cohort (c_i) effects. We define T_{apc} (the average tenure of individuals who were age a in survey year p and cohort c) such that $T_{apc} = \frac{\sum_{i=1}^{n_{apc}} T_{iapc}}{n_{apc}}$, where n_{apc} is the number of individuals in the corresponding APC cell. We also define vectors of age, period, and cohort dummies: $\boldsymbol{A}_k = \mathbb{I}[k = a], k = 1, \dots, K$, $\boldsymbol{P}_l = \mathbb{I}[l = p], l = 1, \dots, L$, and $\boldsymbol{C}_m = \mathbb{I}[m = c], m = 1, \dots, M$, where K is the number of age categories, L is the number of survey rounds, M is the number of generational cohorts, and $\mathbb{I}$ is an indicator function. Then,

$$T_{apc} = \sum_{k=1}^{K} \alpha_k \boldsymbol{A}_k + \sum_{l=1}^{L} \pi_l \boldsymbol{P}_l + \sum_{m=1}^{M} \gamma_m \boldsymbol{C}_m + \varepsilon_{apc}, \tag{1}$$

where ε_{apc} denotes the error term.

To estimate model (1) using the APC method, we construct a panel of individuals by their APC identifiers. The EU-LFS collects age information in five-year intervals, and we combine survey years and cohorts to correspond to these five-year intervals to preserve the APC relationship. Thus, we have 11 age intervals, 5 survey-year intervals, and 15 age cohorts.

Figure 3 shows the age effects associated with both estimation methods. Panel a presents the changes in average tenure along the life cycle of workers estimated by the ME method (Browning, Crawford, and. Knoef 2012). Panel b shows the result of the Deaton-Paxon (DP) (1994) decomposition. As expected, tenure increases with age almost linearly, with a sign of stabilization after 55. The ME decomposition estimates that, on average, a 30-year-old worker has 3 years more

[11] The least squares estimator proposed by Deaton and Paxson (1994) remains popular and widely used in economic analysis, despite its deficiencies.[12] Ten years is about the average job tenure for the workers in our sample. Gregg and Wadsworth (2002) used similar tenure categories in analyzing the evolution of job tenure in Great Britain between 1975 and 2000.

tenure than the youngest workers aged 20–24. The DP decomposition produces comparable results, finding a 3.4-year difference. The estimates of the two decompositions diverge further for older workers. For example, the ME approach finds that workers 50–55 have about 10.7 more years of tenure than workers from the youngest group; the DP decomposition reports an 11.7-year difference.

Figure 4 presents the cohort effects on tenure for both estimation methods. The average tenure declines over time for younger age cohorts in both decompositions. The negative gradient of job tenure is more pronounced in panel a, which shows the results of the ME decomposition. The average worker born in 1940, for example, has 3.6 more years of tenure than the average worker born in the 1980s. The DP decomposition shows similar dynamics, with a weaker decline in tenure over cohorts (the difference in tenure between the 1940 and 1980 cohorts is 2.6 years).

Figure 5 shows the estimated period effects for both estimation methods. We grouped survey years into five-year intervals to preserve the APC age-period-cohort identity. This grouping results in only five survey periods, making the decomposition of the period effects less informative. Nevertheless, the ME decomposition indicates an increase in average job tenure between 1995 and 2020 by about a year. The DP decomposition produces a small, barely significant change in the time effects.

4.1. Subsample decompositions

We now turn to subsample decomposition to explore the heterogeneity of the period, age, and cohort effects on tenure duration among different groups of workers. We also want to account, to some degree, for potential compositional change in the labor market during the period covered by the EU-LFS. The analysis in this section is based on the ME APC decompositions.

Figure 6 shows the decomposition of the age effect by gender, educational level, region, and type of contract. The age effect is increasing and similar for all subsamples. Panel a of figure 6 reveals a steeper age profile of tenure for male workers than for female workers. These results are consistent with other studies that report shorter tenure among female workers (Burgess and Rees 1998; Hollister and Smith 2014). The gender differences in tenure among older age groups may also be attributed to the different official retirement ages for male and female workers (Turner and Morgavi 2020).

The APC decompositions in panel b reveal no significant differences in age effects across educational categories. Job tenure is shorter for workers on temporary contracts than for permanent job holders (panel c). Workers from Central Europe and the Baltic countries have the steepest age profiles, followed by workers from Southern Europe. The profiles of workers from Western and Northern Europe are almost identical until the age of 55; after that, they diverge, probably reflecting differences in the official retirement age in the two regions (panel d).

Figure 7 shows the cohort effects by subsample. Tenure declines for younger cohorts almost uniformly for all subsamples. Among younger cohorts, tenure declines more rapidly for male workers than female workers (panel a). The tenure trajectory by birth cohort varies by educational level (panel b). Birth cohorts for workers from Western, Northern, and Southern Europe exhibit a common secular trend (panel c). The tenure of workers with permanent contracts exhibits a decline that is consistent with that for the gender and education subsamples. The tenure of workers on temporary contracts remains almost constant across age cohorts (panel d). This last set of findings suggests that the increased prevalence of temporary contracts observed among the young in Europe (Bussolo et al. 2018) cannot explain the decrease in job tenure for younger cohorts: in fact, the decrease in tenure is observed particularly for those who have permanent contracts. This could indicate an increasingly inefficient job search process, as the quality of job matches may be deteriorating irrespective of the contractual conditions.

The cohort effect declines for older workers in Central Europe and the Baltic countries. It stabilizes at a low level for younger cohorts of workers from this region. This trend could reflect structural changes in the economies of these countries during the period of transition to the market economy in the early 1990s when large numbers of state-owned enterprises were closed, and many new privately owned firms opened, interrupting job tenure for most workers.

5. Modeling Individual Tenure

The APC analysis of the previous section focuses on the evolution of job tenure over time and age cohorts, controlling for the effects of the aging population and its educational profile at a group level. But the characteristics of the group members could change over time. For example, individuals within a group may repeatedly change their family and fertility status, type of their employment, occupations, industries, and mobility preferences. If such characteristics affect job tenure, the APC approach cannot account for these compositional changes, and a different approach is needed to estimate tenure trends.

This section presents an individual-level analysis of the evolution of job tenure conditional on workers' and employers' characteristics that can change over time. The primary objective of this analysis is to understand whether a long-term decrease in job tenure -like the one found in the APC analysis- could be explained by changes in individual characteristics of the European labor force. The persistence of a trend in tenure after controlling for these characteristics would imply that other factors, probably operating at the economy-wide level, may drive the evolution of job tenure.

We estimate the probability that a person holds a job for less than a year, between 5 to 10 years, and more than 10 years over the time span of our surveys.[12] We capture both the short- and long-term (countercyclical) effects of business cycles on job tenure by covering these tenure periods. In the period of economic expansion, new workers are hired, lowering the average tenure; during an economic contraction, hires are reduced, increasing the average tenure (Arozamena and Centeno 2006). If job turnover increased over time, the share of employees with less than 1 year of tenure (short-term jobs) should have increased, while the shares of employees with more than 5 years (medium-term jobs) and more than 10 years (long-term jobs) should have declined.

The economic models of quits and layoffs (Parsons 1986; Mortensen 1986) provide the basis for the empirical estimation strategy presented in this section.[13] The likelihood that a worker reaches a given job tenure depends on the probability of being terminated. That probability is a function of the worker's characteristics, her job characteristics, and the characteristics of the employer. The worker's outside opportunities are affected by her age, education, and occupational group. Characteristics of the household the worker resides in, and the worker's marital status affect her preferences about job stability. For example, married workers may be less inclined to relocate to a job if their spouse is also working. Workers with school-age children might be reluctant to move to take a new job. Race, ethnicity, disability, and chronic illnesses may also affect the probability of job termination.

[12] Ten years is about the average job tenure for the workers in our sample. Gregg and Wadsworth (2002) used similar tenure categories in analyzing the evolution of job tenure in Great Britain between 1975 and 2000.

[13] Sickness and retirement might also determine the duration of job tenure. We assume that the factors explaining the probability of layoffs and quits are also relevant for the retirement decision and determine the probability of getting sick (Burgess and Rees 1998).

The production processes and organizational technologies of the worker's employer can be captured by the type of industry the worker is employed in. Decker and others (2014) and Hyatt and Spletzer (2013) find that changes in industry composition result in changes in working practices, which, in turn, may reduce tenure. Country characteristics and unemployment rates also affect the probability of a job's termination.

Our estimation strategy is based on the two-stage approach proposed by Jager and Huff Stevens (1999) for the United States and Gregg and Wadsworth (2002) for the United Kingdom.[14] In the first stage, we estimate the separate probabilities of a worker having short ($T^* < 1$ year), medium ($5 < T^* \leq 10$ years), or long ($T^* > 10$ years) tenure as a function of **X**, a vector of individual characteristics, **E** a vector of job characteristics, and a set of country dummies:

$$Prob(T_i <> T^*) = f\left(\sum_{k=1}^{K} \alpha_k \boldsymbol{X}_i^k + \sum_{j=1}^{J} \alpha_j \boldsymbol{E}_i^j + \sum_{c=1}^{29} \gamma_c Country_i + \sum_{t=1995}^{2019} \pi_t Year_i + \varepsilon_i\right). \quad (2)$$

We use a binary probit model to estimate equation (2). Consistent with previous studies, we estimate the probability of being on the job for less than a year on the sample of individuals 20 and older. The probability of being on the job for more than five years is estimated on the sample of individuals 25 and older, and the probability of job tenure exceeding 10 years is estimated on the sample of individuals 30 and older.[15]

To account for the effect of individual characteristics on job tenure, we include in **X** a dummy for the worker's gender, the worker's age and age squared, education-level dummies, a dummy if a worker is married, the share of children, and household size. Regarding job characteristics, we include a dummy for the nature of the job contract (temporary or permanent) and whether the job is full- or part-time. A temporary job could capture the differential ability of firms to release workers (Gregg and Wadsworth 2002). Workers employed part-time or self-employed are more likely to break their tenure than full-time workers (Garcia-Cabo and Mudero 2019). We control for occupation by a set of dummies based on the two-digit International Standard Classification of

[14] Bratberg, Salvanes, and Vaage (2010) used a similar methodology to analyze changes in job stability in Norway.

[15] Data on tenure derived from the recall questions on the year when a worker started her current job might contain systematic errors correlated with the duration of tenure (Duncan and Hill 1985, Bollinger et al. 2019). These errors might bias estimates of tenure duration. We are unaware of the analysis of such biases for the EU LFS, but typically these errors could lead to a slight overestimation of the longer-term tenure, which, qualitatively, should not affect the main conclusions of our analysis.

Occupations (ISCO) classification (ILO 2021)[16] and use five dummies corresponding to different firm sizes (Bryson, Erhel, and Salibekyan 2021). We also include 29 country dummies to control for country-specific differences in the labor market and 26 year-dummies to capture the time trend.

To identify the time effects in equation (2), we assume that the coefficients of our control variables are constant over time. Burgess and Rees (1998) find little evidence of significant changes in the effects of the main control variables over time. We derive the marginal effects of the year dummies estimated at the sample means. These marginal effects could be interpreted as conditional sample-year average proportions of each tenure duration.[17]

In order to investigate the presence of a secular trend in the probability of having each tenure duration, we then proceed to the second-stage estimation, which consists of linear regression with the marginal effects of each year dummy as a dependent variable and a linear time trend as the single independent variable (equation 3). We bootstrap the standard errors of the second-stage estimations to account for the small sample error heteroskedasticity:[18]

$$\left.\frac{\partial \widehat{Prob(T_i <> T^*)}}{\partial Year_t}\right|_{\overline{X,E,Country}} = \alpha + \beta Time + u_t\ . \tag{3}$$

Estimation of equation (2) on a pooled sample of 29 countries and 26 years demonstrates that on average, workers who are younger, male, have higher levels of education, and work on temporary contracts or part-time were more likely to have short tenure (less than one year). Short job tenure is inversely related to firm size. Workers who are older, male, hold full-time jobs on permanent contracts, and work for larger firms were more likely to hold their jobs for more than 5 years or more than 10 years. Better-educated workers were less likely to have longer tenure.[19]

Table 3 shows the results of the second-stage regressions for three categories of tenure as dependent variables (columns) and different subsamples (rows).[20] For example, the coefficients for four

[16] We use two-digit occupation classification because the LFS transitioned from the ISCO 88 classification that was used before 2010 to the ISCO 08 classification after 2010. A correspondence between both classifications is possible only at the two-digit level.
[17] For the second-stage regression we could also use the probit estimated coefficients (π_t). However, using the marginal effect simplifies the interpretation of our results.
[18] We estimate the standard errors of the second-stage regression using 500 bootstrapped sample draws (Imbens and Kolesar 2016).
[19] The results of these estimations are available from the authors on request.
[20] Figure A1 in the Appendix shows the scatter plot of 26 marginal effects against the survey year and the OLS fitted line corresponding to the estimation of the probability of having tenure less than 1 year for the total sample of observations (the first cell in Table 3).

groups of countries are estimated based on subsamples of countries comprising each of these groups. The coefficients correspond to the coefficient β in equation (3), transformed to be interpreted as an annual percentage change. The first column of results shows the annual percentage changes in the probability of holding a short-term job (tenure of less than one year). For the total pooled sample of EU-LFS, that probability increases by 0.10 percentage points a year. The estimate is highly significant (p-value = 0.000). Extrapolating this result over the period covered by the survey gives about a 2.55-percentage point increase in the probability of holding a short-term job between 1995 and 2020. This result indicates the presence of a long-term increase in the probability of having a short tenure that cannot be explained by changes in a varied set of individual and job level characteristics such as education, marital status, household composition, occupation, and type of employment.[21]

The probability of having less than a year of job tenure increased more rapidly among female workers than male workers. This result is consistent with other studies of the European labor market (for example, Cipollone Patacchini and Vallanti 2014), which find that women may increasingly rely on fixed-term contracts, usually of shorter duration, to participate in the labor market. The likelihood of having a short-term job increased more for better-educated workers than their less-educated peers. Better-educated workers are likely to have more job opportunities and, as a result, higher job mobility. The probability of having a short job tenure increased over time almost twice as rapidly for workers 30–40 than for workers 50 and older

The probability of having job tenure of less than a year varied significantly across the regions of Europe. It increased over time in Western and Northern Europe and exhibited no significant time trend in Southern Europe (the time coefficient is not significant). The decline in the probability of having a short job tenure in Central Europe could be associated with the period of transition to the market economy in the early-mid 1990s, when many state-own enterprises were privatized, interrupting the job tenure of their employees (see, for example, Nellis 2001).

[21] We also test the robustness of our results in terms of the linearity of the time trend. The concern is that the tenure could have gone down over time because of a large number of layoffs during the Great Recession of 2008 and its prolonged aftermath but increased afterwards. The estimation of a specification that includes both a linear and squared time trend produces results that are qualitatively similar to those shown in Table 3. However, the magnitude of the total effect of the time variable is slightly attenuated when compared to the linear time trend specification. These results are available from the authors on request.

Estimates of the probability of having job tenure between 5 and 10 years increase for male workers, older workers, and workers from Central Europe. The probabilities of having tenure of more than 10 declined over time for the whole sample and each subsample, except only for Central Europe. The dynamics of the intertemporal changes in medium- and long-term tenure are also consistent with changes in the probability of having a short-term job. Over the sample period, the shares of long-term jobs declined more rapidly for male workers than for female workers. The trend estimates imply a decline in the probability of having a long tenure between 1995 and 2020 by about 7.5 percentage points for men and 6.2 percentage points for women. This decline in long tenure jobs could be potentially associated -particularly for men- with increased lay-offs, as found by Bergmann and Mertens (2011) for Germany.

A comparison of the coefficients on educational categories reveals that the share of long-term jobs declined more rapidly for lower-educated than for better-educated workers. Younger workers experienced a sharper drop in long-term tenures than older workers. The share of workers with more than 10 years of tenure declined the most in Northern Europe and Western Europe. These shares decreased only slightly in the countries of Southern Europe. The estimations uncovered no significant trends in the probabilities of having long-term jobs in Central Europe.

We also estimate time trends in job tenure by controlling for cyclical changes in the job market, using an approach similar to that of Gregg and Wadsworth (2002). We use the aggregate level of GDP in the European Union as a measure of the business cycle effect on the labor market and include it as an additional regressor in equation 3. Table A.2 in the appendix shows the results of this alternative specification. Like the authors of previous studies, we find that controlling for the cyclicality of the job market has no significant impact on time trends in job tenure.

6. Explaining the Main Drivers of Job Tenure Dynamics

The results presented in the previous section show that there has been a long-term decrease in the length of job tenure in Europe during the last two decades and a half. This decrease cannot be attributed to changes in the individual characteristics of the European labor force. In this section, we explore possible drivers of this secular decrease in job tenure.

The effect of globalization and technological change on jobs and long-term employment has brought the discussion of job tenure and job stability to center stage. The need for more flexible labor markets has led to significant changes in European employment law, providing employers with more options to hire fixed-term, part-time, and temporary workers (Cazes and Tonin 2010). These changes in employment protection legislation (EPL) mainly affect new hires; incumbent workers' job protection practices remained unchanged.

Because of this asymmetry, EPL reforms could have a heterogeneous impact on the job tenure of younger, less educated, and female workers. The flexibility of employment protection in the transition economies of Europe has had a powerful effect on the job stability of younger workers. Some countries in the region have adopted reforms to reduce labor market segmentation by removing barriers for these vulnerable groups to access jobs (O'Higgins 2010). Italy (Pinelli and others 2017) and Spain (Corral 2015) introduced reforms incentivizing tenure in 2012. France (Insarauto and others 2015) and Slovenia (Vodopivec 2016) did so in 2013.

In this section, we investigate the extent to which changes in EPL over the last 26 years affected the dynamics of job tenure in Europe across various groups of workers. Our empirical strategy expands the empirical approach of the previous sections. We use an econometric specification similar to equation (2), but instead of including the set of country dummies, we estimate time trends for each tenure duration separately for each country. For every country, c, we estimate:

$$Prob(T_i < T^*)_c = f(\sum_{k=1}^{K} \alpha_k X_i^k + \sum_{j=1}^{J} \alpha_j E_i^j + \sum_{t=1995}^{2020} \pi_t Year_i + \varepsilon_i)_c. \quad (4)$$

We derive the marginal effects for 26 year-dummies based on the probit estimation of equation (4) for each of the 29 countries. These marginal effects can be interpreted as country-year average conditional proportions of each type of job tenure. We then estimate how these proportions changed over time and whether tightening employment protection regulations affected that trend. We regress the marginal effects on the country-year-specific indices of EPL, controlling for the time trend and the country fixed effects on a panel sample of 754 (29 x 26) country-year observations. This empirical model is represented in equation 5:

$$\left.\frac{\partial \widehat{Prob(T_i <> T^*)}}{\partial Year_{t,c}}\right]_{\bar{X}_c, \bar{E}_c} = \alpha + \beta Time + \theta EPL_{t,c} + \sum_{c=1}^{29} \gamma_c Country_c + v_t. \quad (5)$$

We use two EPL indices compiled by the OECD: the EPR, also called the index of "strictness of regulation of individual dismissals of workers on regular contracts," and the EPT, also called the index of "strictness of hiring regulation for workers on temporary contracts" (OECD 2020). The indicators of employment protection are synthetic indicators of the strictness of regulation on dismissals and the use of temporary contracts. Higher values of the first index correspond to a situation in which it is difficult to dismiss workers with regular contracts. Higher values of the second index correspond to a situation where it is more difficult to hire temporary workers. We expect that stricter dismissal regulations and stricter regulations on hiring temporary workers would both increase the probability of having medium- and longer-term jobs and decrease the probability of short-term tenure.

The top panel of Table 4 presents the estimates of θ in equation (5) using the EPR index (stricter dismissal policies). Changes in this synthetic indicator are challenging to quantify; we, therefore, interpret these results qualitatively. As expected, stricter dismissal policies reduce the probability of having tenure of less than one year. Fewer workers are fired from regular jobs and the number of people changing jobs declines. The effect of this regulation appears to be stronger for female workers and for younger workers—the groups that are probably first to be laid off during economic downturns. Better-educated workers seem to be less affected by these regulations. There is no statistically significant effect of stricter dismissal policies on the probability of having medium- and long-term jobs, suggesting that the effect of this regulation is concentrated on short tenure jobs.

The bottom panel of Table 4 shows the estimates of θ in equation (5) using the EPT index (stricter regulations on hiring temporary workers). By increasing the costs of hiring temporary workers, this regulation positively affects the probability of having a medium- and long-term tenure job while having no statistically significant effects on short-term tenure. This policy seems to protect more senior workers; the tenure duration of younger workers is not unaffected. There is no statistically significant effect of stricter hiring rules for temporary workers on the probability of short tenure jobs.

These set of findings on the effect of employment protection legislation on job tenure merit further discussion. Evidence from the United States, where contrary to Europe, the share of short tenure jobs has declined, suggests that in that country, the hiring and screening process of potential employees by employers has improved, leading to a smaller prevalence of "bad quality" job matches and, thus, a reduction in the number of short tenure jobs (Molloy, Smith and Wozniak 2021, Pries and Rogerson 2022). The changes in the employment protection legislation in Europe, in many cases implemented to improve labor market dynamism, may have operated in the opposite direction: by reducing the costs of dismissing employees in permanent contracts and easing the hiring of temporary employees, employers may have discarded hiring and screening practices which would have ensured a good job match. The job search process may have become noisier, particularly for the younger generations who, as described in the results of section 4.1, have seen a decrease in average job tenure even when holding a permanent employment contract.

Another possible driver of the decrease in tenure could be trade openness. Evidence from the United States and Europe shows that globalization has had strong effects on labor markets (see, for example, Acemoglu and Autor 2010; Autor, Dorn, and Hanson 2013). We hypothesize that trade openness has a negative impact on tenure, as it increases competition for firms, leads to the adoption of more efficient ways of production, and facilitates the allocation of jobs, increasing job turnover.

The top panel of Table 5 presents the estimates of θ of a specification of equation (5) in which, instead of the EPL index, we include the change in trade openness, measured as the change in the sum of exports and imports as a percentage of GDP, as an additional regressor. The results show that increases in trade openness increased the probability of holding a short-term job. There appears to be no correlation with changes in the probability of holding a medium- or long-term job.

The growing evidence on the effects of ICT–related technological change on the labor market indicates that innovations and new technologies affect different groups of workers differently. This skill bias has been accelerating over the last decades (see, for example, Acemoglu 2002). Technological progress affects the organization of the labor market, including labor market policies and production processes; through these channels, it is expected to affect the structure of employment and job tenure.

The bottom panel of Table 5 shows the estimation of the impact of ICT-related technological change on the probability of having jobs of different duration (as in equation 5). We use the growth rate in the per capita ICT capital stock, derived from the KLEMS database (Jorgenson 2012), as a proxy for the penetration of technological innovations and digitalization in the economy. The estimations demonstrate an overall positive association between a higher ICT capital stock and the share of short- and medium-tenure jobs. The ICT-related technological change appears to increase these shares more among female, better-educated, and more senior workers. Shorter job tenure among better-educated workers may reflect increased job mobility and voluntary movement to better job matches; the larger share of short-term jobs among senior workers could indicate higher dismissal rates. The results presented in Table 5 are based on a smaller sample of observations because of the limitations of the KLEMS data set and should therefore be interpreted with caution.

7. Conclusions

This paper analyzes the evolution of job tenure in Europe from 1995 to 2020. We use data from the EU-LFS to document general trends in job tenure. We then apply a series of age-period-cohort decompositions to analyze the evolution of job tenure for specific cohorts and time periods. This decomposition analysis shows that job tenure has shrunk for the younger generations, and this cannot be accounted for only by the increased prevalence of temporary jobs among the young, as job tenure has also declined for those who hold permanent contracts. To account for compositional changes in groups, we model tenure at the individual level in a second step. We estimate the probability of having short, medium, or long job tenure, conditional on a set of individual characteristics (such as age, gender, and education) and employment-related characteristics (such as occupation and firm size). The results show that after controlling for individual and employment characteristics, the probability of having a medium- or long-term job declined, and having a short-term job increased over time.

We also assess the impact of changes in the levels of job protection, trade openness, and technological change on tenure decline. We find that stricter job protection legislation is associated with decreases in the probability of having short-term jobs, and trade openness is associated with a significant increase in that probability. We also find a positive correlation between increases in ICT use and short-term tenure, although these results are less conclusive, given the smaller sample size.

But what is the impact of these changes in job tenure and job stability on workers? For example, when we document that technological change and increased trade openness reduce job tenure, is that a good thing or a bad thing? As mentioned in the introduction, efficiency and equity arguments matter for answering this question. In terms of efficiency, on the one hand, good job matches should last longer, so declining job stability could mean deteriorating job match quality (e.g., Altonji and Williams 2005). On the other hand, some evidence indicates that job reallocation can be productive (Newmark 2002). To resolve this, future research should link the results of this paper with a detailed analysis of changes in earnings profiles. In addition, to fully understand the effects of tenure trends on the wellbeing of workers, one should account for potential disparities in impacts. While at the aggregate level the impact of shorter tenure may be a minor reduction in wellbeing, some groups may be affected much more severely with negative long-term consequences for societal cohesion.

Further research could, for example, link micro-level data on workers with firm-level data and thus allow for a more refined analysis of how structural changes in the labor market will affect different groups of workers. More research could also shed light on whether the observed changes in tenure can be attributed to increased voluntary job transitions or more frequent dismissals and job market separations.

The concerns about the deterioration of job stability in the public debate in Europe are not ungrounded. Job tenure in Europe declined over the last 26 years, with young people, people with low levels of education, and women most affected by the decline. Policy makers should take these trends seriously, as the decline in job stability will likely reduce workers' welfare over the life cycle. The decline in the number of long-term jobs could be related to the loss of earnings associated with firm-specific skills, an overall decrease in household savings over time, or the ending of occupational pension accruals for older workers, putting additional strain on systems of social insurance. Additionally, the decline in average tenure may reflect an overall decrease in the efficiency of the job search and matching process, which may have become noisier.

The COVID-19 pandemic continues to alter the structure of European labor markets in profound ways. It could reduce employment and, consequently, job tenure (von Wachter 2021). The adoption of technology and structural shifts in the workforce that are expected to accelerate in the aftermath of the pandemic bring the issues of job security and job stability to the forefront of the European policy agenda.

8. References

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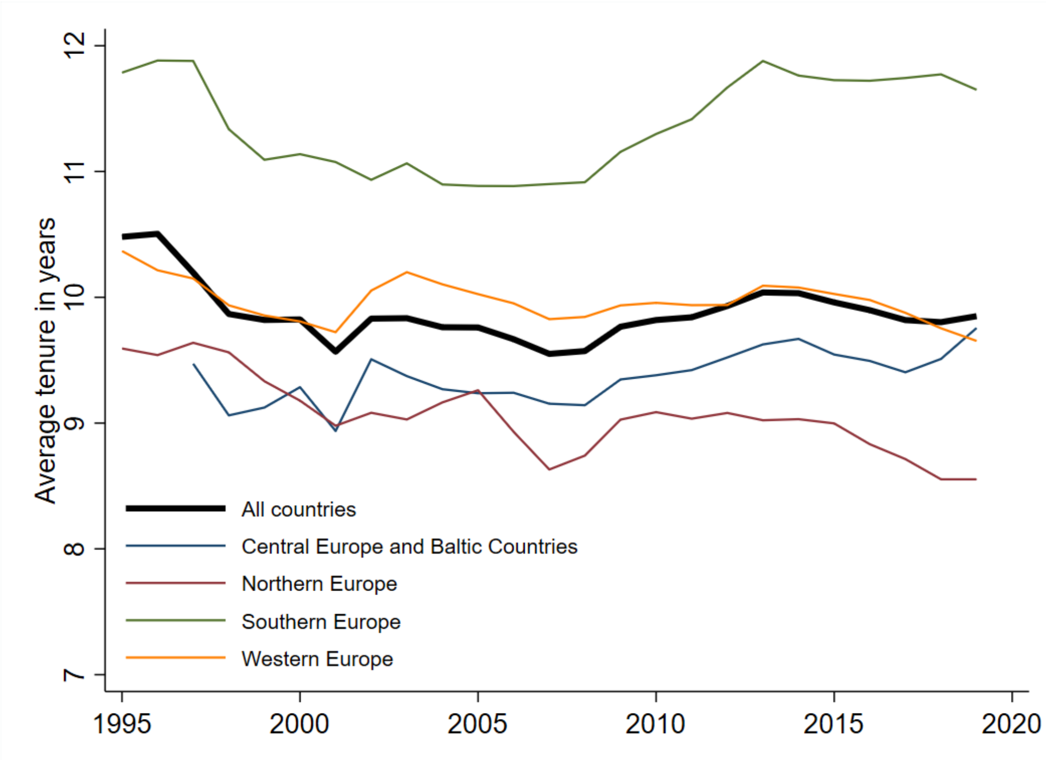
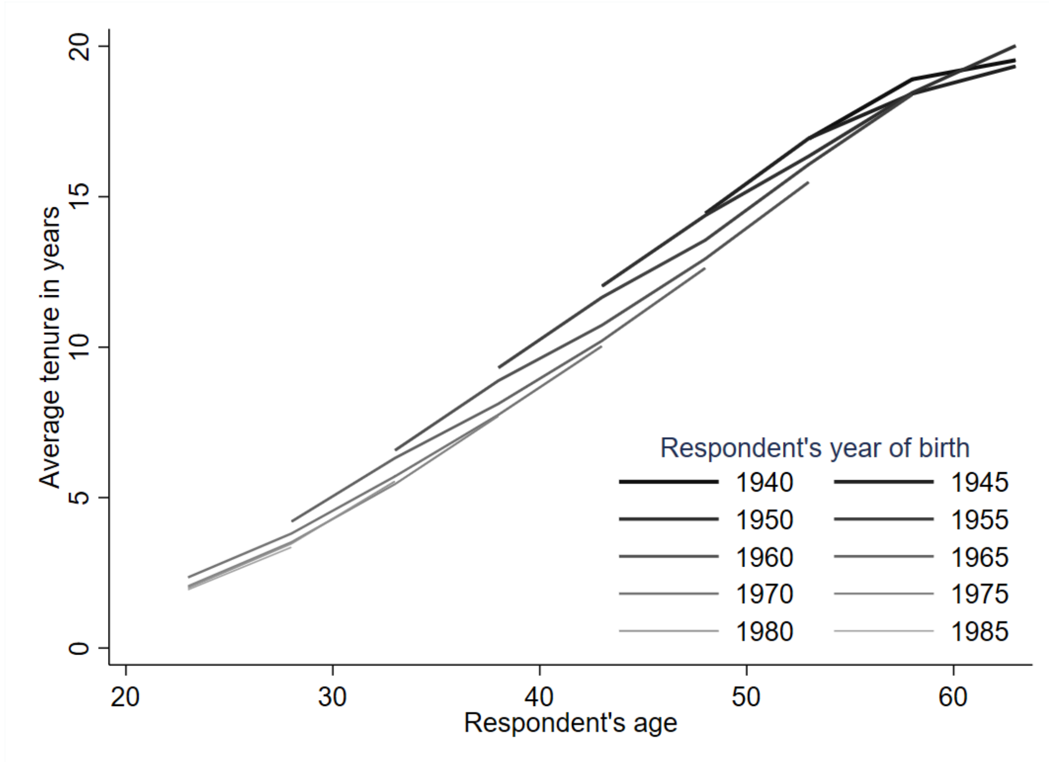
Figure 1: Average tenure by year and subregion of Europe



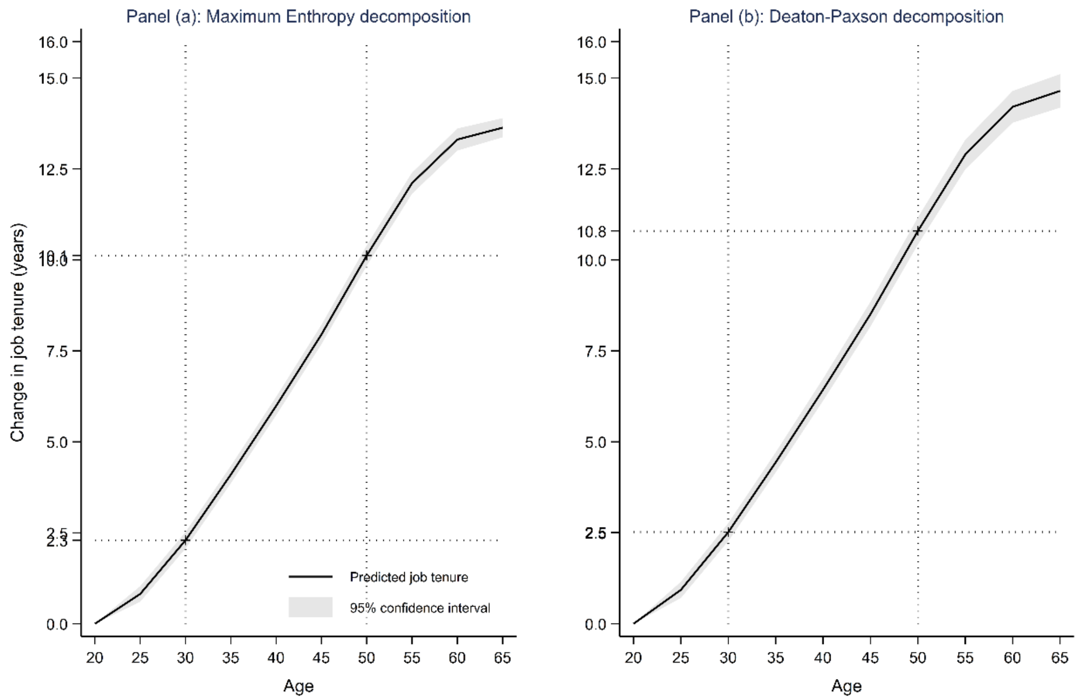
Note: Sample includes employed population 20–65.

Figure 2: Average tenure by cohort and age



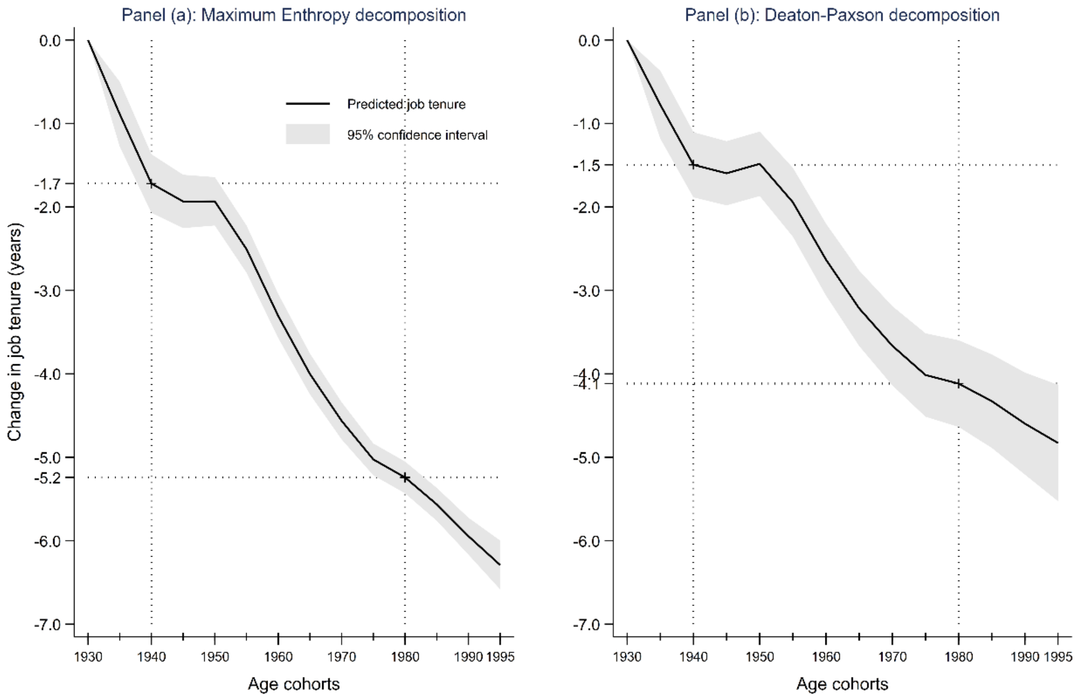
Note: this figure plots the average tenure (in years) by age for five-year birth cohorts. Sample includes employed population 20 to 65 and all countries in the sample.

Figure 3: Changes in job tenure by workers' age



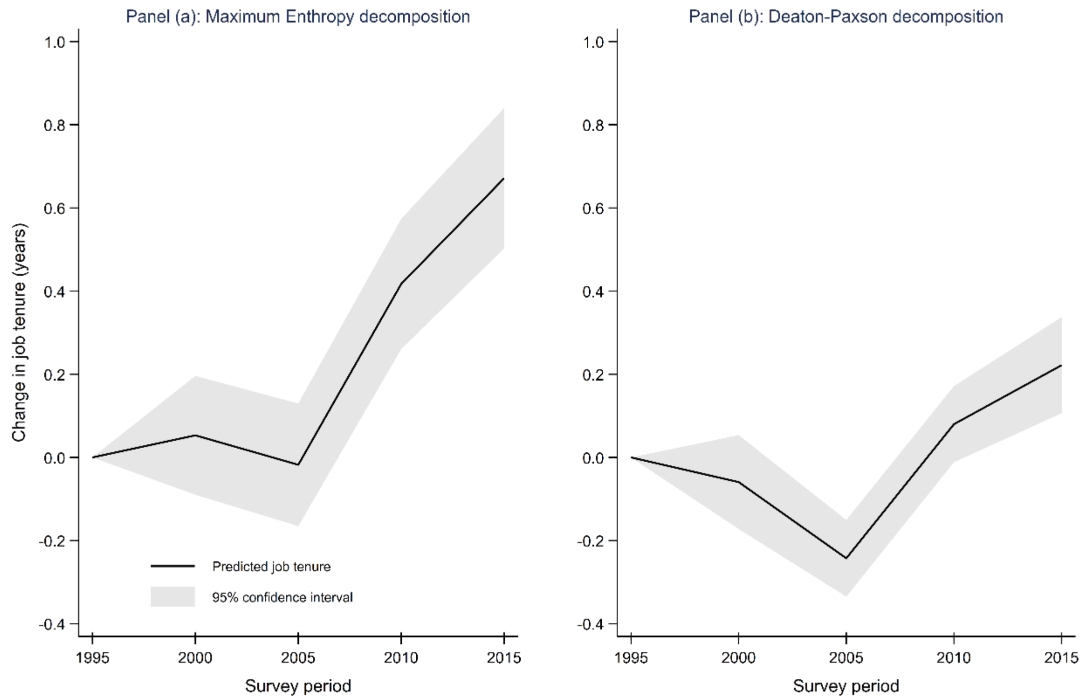
Note: Figures show changes in job tenure relative to the youngest group of workers (workers 15–20). The synthetic panel is based on the pulled sample of all workers 20–65 in 29 countries from 26 years of data from the EU-LFS.

Figure 4: Changes in job tenure by workers' age cohorts.



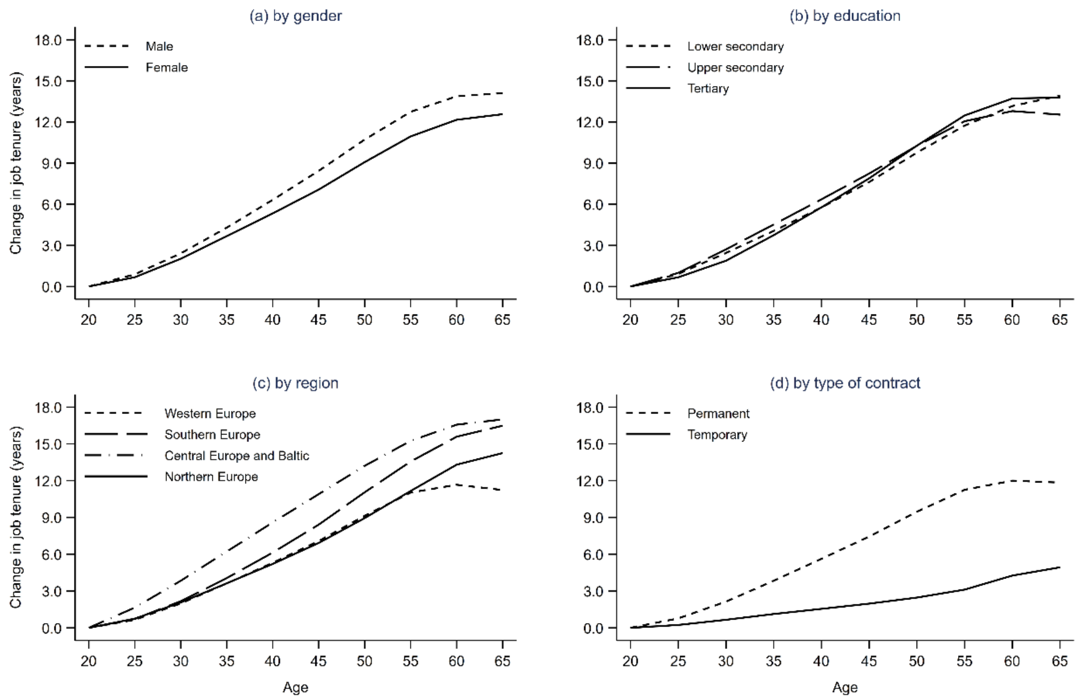
Note: Figures show changes in job tenure relative to the cohort of workers born in 1930. The synthetic panel is based on the pulled sample of all workers 20–65 years in 29 countries from 26 years of data from the EU-LFS.

Figure 5: Changes in job tenure by survey period.



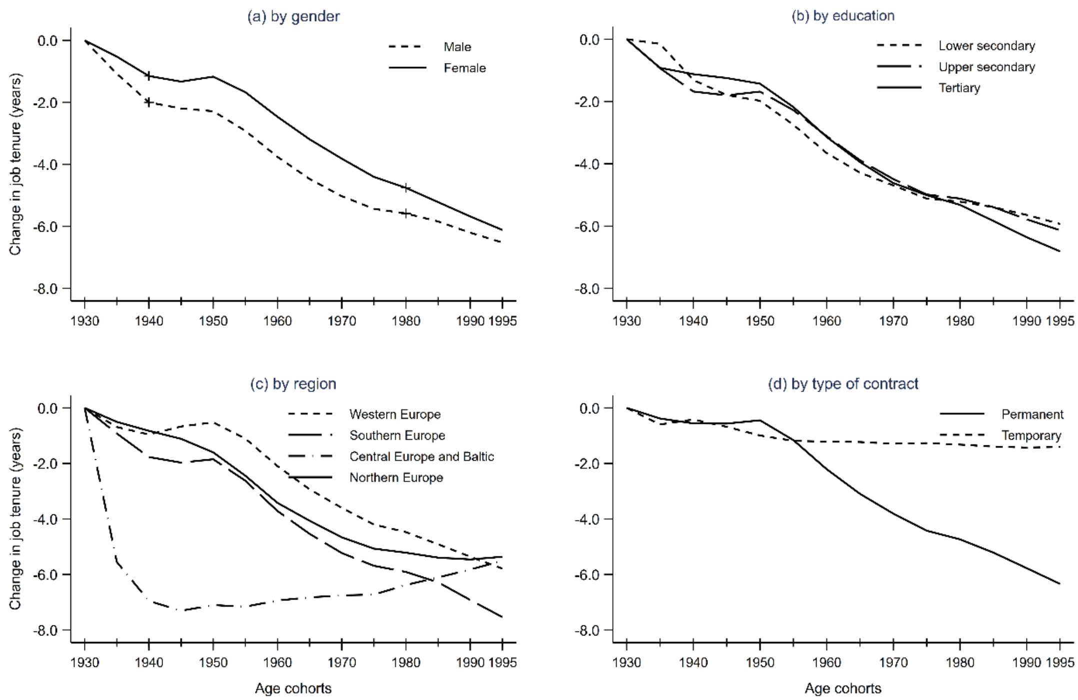
Note: Figures show changes in job tenure relative to the 1995 survey period. The synthetic panel is based on the pulled sample of all workers 20–65 in 29 countries from 26 years of data from the EU-LFS.

Figure 6: APC ME decomposition of age effect by different characteristics.



Note: Figures show changes in job tenure relative to the 1995 survey period. The synthetic panel is based on the pulled sample of all workers 20–65 years in 29 countries from 26 years of data from the EU-LFS.

Figure 7: APC decomposition of cohort effect by different characteristics.



Note: Figures show changes in job tenure relative to the 1995 survey period. The synthetic panel is based on the pulled sample of all workers 20–65 years in 29 countries from 26 years of data from the EU-LFS.

Table 1: Descriptive statistics.

Variable	Mean	Std. Dev.	Min	Max	Obs
Tenure (in years)	10.44	9.93	0	47	24,506,274
Female	0.47	0.49	0	1	---
Age	41.42	11.23	22	62	---
Education					
Lower secondary	0.22	0.41	0	1	---
Upper secondary	0.48	0.49	0	1	---
Tertiary	0.27	0.44	0	1	---
Married	0.31	0.46	0	1	---
Temporary work	0.11	0.31	0	1	---
Full-time work	0.84	0.36	0	1	---
Firm size (number of employees)					
1 - 10	0.25	0.43	0	1	---
11 - 19	0.11	0.32	0	1	---
20 - 49	0.15	0.36	0	1	---
50 or more	0.36	0.48	0	1	---
Less than 11	0.04	0.20	0	1	---
More than 10	0.25	0.43	0	1	---
GDP growth	1.53	2.18	-4.92	3.90	29
EPR (v.1)	2.40	0.80	1.10	5	690
EPT (v.1)	1.92	1.22	0.125	5.25	690
Trade openness	105.57	56.04	36.16	408.36	724
ICT per capita capital stock (EUR th.)	454.46	672.56	2.74	6678.61	436

Note: EU-LFS 1995-2020

Table 2: Average tenure by subgroups, 1995-2020.

	Representative years					
Sub-samples	1995	2000	2005	2010	2015	2020
Total	10.32	10.27	10.04	10.19	10.47	10.33
Gender						
Males	11.11	10.80	10.43	10.63	10.84	10.67
Females	9.19	9.56	9.54	9.66	10.03	9.94
Education						
Lower-secondary	11.32	11.53	11.37	11.56	11.67	11.21
Upper-secondary	9.64	9.80	9.58	9.90	10.44	10.34
Tertiary	9.70	9.43	9.46	9.56	9.86	9.89
Age						
25-29	4.20	3.81	3.52	3.47	3.35	3.06
30-39	7.91	7.61	6.93	6.63	6.67	6.25
40-49	13.22	12.96	12.10	11.54	11.31	10.87
50+	18.44	18.10	17.54	17.46	17.38	17.04
Type of contract						
Permanent	10.62	10.55	10.44	10.56	11.04	10.83
Temporary	1.86	2.22	2.26	2.30	2.40	2.40
Sub-regions						
Central Europe	N/A	9.29	9.24	9.38	9.55	9.76
Northern Europe	9.59	9.18	9.26	9.09	9.00	8.55
Southern Europe	11.79	11.14	10.89	11.30	11.73	11.65
Western Europe	10.37	9.81	10.03	9.96	10.03	9.65

Note: EU-LFS 1995-2020

Table 3: Estimated Yearly Percentage Point Trends for three tenure categories, 1995-2020.

	Length of tenure (years)					
	Less than 1		5 to 10		More than 10	
Sub-samples	Coeff.	*Std. error*	Coeff.	*Std. error*	Coeff.	*Std. error*
Total	0.098***	*0.018*	0.046	*0.036*	-0.269***	*0.035*
Gender						
Males	0.079***	*0.019*	0.070**	*0.033*	-0.288***	*0.036*
Females	0.119***	*0.017*	0.014	*0.039*	-0.240***	*0.036*
Education						
Lower-secondary	0.069**	*0.021*	0.063	*0.038*	-0.307***	*0.040*
Upper-secondary	0.091***	*0.019*	0.048	*0.034*	-0.263***	*0.033*
Tertiary	0.128***	*0.017*	0.024	*0.039*	-0.191***	*0.029*
Age groups						
30-40	0.104***	*0.018*	0.050	*0.053*	-0.265***	*0.047*
40-50	0.079***	*0.012*	0.113**	*0.032*	-0.324***	*0.031*
50+	0.056***	*0.008*	0.054**	*0.018*	-0.196***	*0.021*
Sub-regions						
Central Europe	-0.135**	*0.040*	0.153***	*0.033*	0.041	*0.037*
Northern Europe	0.149***	*0.026*	0.020	*0.043*	-0.496***	*0.026*
Southern Europe	-0.002	*0.024*	0.068	*0.046*	-0.156***	*0.036*
Western Europe	0.211***	*0.021*	-0.006	*0.042*	-0.302***	*0.047*

Note: Coefficients and standard errors are estimated from a linear regression of 26 marginal effects of the year dummies on the linear time trend. Marginal effects are derived from estimating the probability of a worker having one of three durations of job tenure. Estimation of the probability of a worker having less than one year of job tenure is conducted on a sample of respondents older than 20. The probability of a worker having 5–10 years of tenure is estimated on a sample of respondents 25 and older. The probability of having 10 or more years tenure is estimated on a sample of workers 30 and older. EU-LFS 1995-2020. Bootstrapped standard errors. *** indicates that the coefficient is significant at 1% level, ** - at 5% level, * - at 10% level.

Table 4: The impact of stricter employment protection measures on the probability of having short, medium, and long-term job tenure, 1995-2020.

	Length of tenure (years)					
	Less than 1		5 to 10		More than 10	
Sub-samples	Coeff.	*Std. Error*	Coeff.	*Std. Error*	Coeff.	*Std. Error*
			More difficult to dismiss regular workers			
Total	-0.861**	*0.333*	0.021	*0.317*	0.347	*0.931*
Gender						
Males	-0.788*	*0.346*	0.308	*0.330*	-0.863	*0.939*
Females	-0.940**	*0.333*	-0.285	*0.346*	1.774**	*0.989*
Education						
Lower secondary	-0.987**	*0.480*	-0.323	*0.375*	0.400	*1.078*
Upper secondary	-1.024**	*0.364*	0.132	*0.339*	0.207	*0.973*
High: Third level	-0.728**	*0.284*	0.012	*0.306*	-0.405	*0.849*
Age						
30-40	-0.764**	*0.349*	0.484	*0.459*	1.330	*1.010*
40-50	-0.395	*0.245*	-0.316	*0.437*	0.334	*1.004*
50+	-0.382**	*0.188*	0.183	*0.394*	-0.601	*0.836*
			More difficult to hire temporary workers			
Total	-0.121	*0.157*	-0.230	*0.165*	1.233**	*0.408***
Gender						
Males	-0.157	*0.161*	-0.169	*0.164*	1.197**	*0.407***
Females	-0.072	*0.157*	-0.249	*0.185*	1.260**	*0.441***
Education						
Lower secondary	-0.159	*0.211*	-0.111	*0.195*	0.915*	*0.461**
Upper secondary	-0.167	*0.165*	-0.085	*0.179*	1.023*	*0.425**
High: Third level	0.010	*0.137*	-0.605***	*0.163*	1.603***	*0.364****
Age						
30-40	-0.189	*0.164*	0.569**	*0.245*	0.148	*0.475*
40-50	-0.189*	*0.112*	-0.649***	*0.202*	2.020***	*0.424*
50+	-0.105	*0.084*	-0.677***	*0.170*	1.833***	*0.345*

Note: Coefficients and standard errors are estimated by the panel regression of 26 marginal effects of the year dummies estimated on subsamples of 29 countries on the linear time trend and the EPR and EPT indexes. The marginal effects are derived from estimation of the probability of a worker having one of three durations of job tenure. Estimation of the probability of a worker having less than one year of job tenure is conducted on a sample of respondents 20 and older. The probability of a worker having 5–10 years of tenure is estimated on a sample of respondents 25 and older. The probability of having tenure of more than 10 is estimated on a sample of workers 30 and older. Bootstrapped standard errors. *** indicates that the coefficient is significant at 1% level, ** - at 5% level, * - at 10% level.

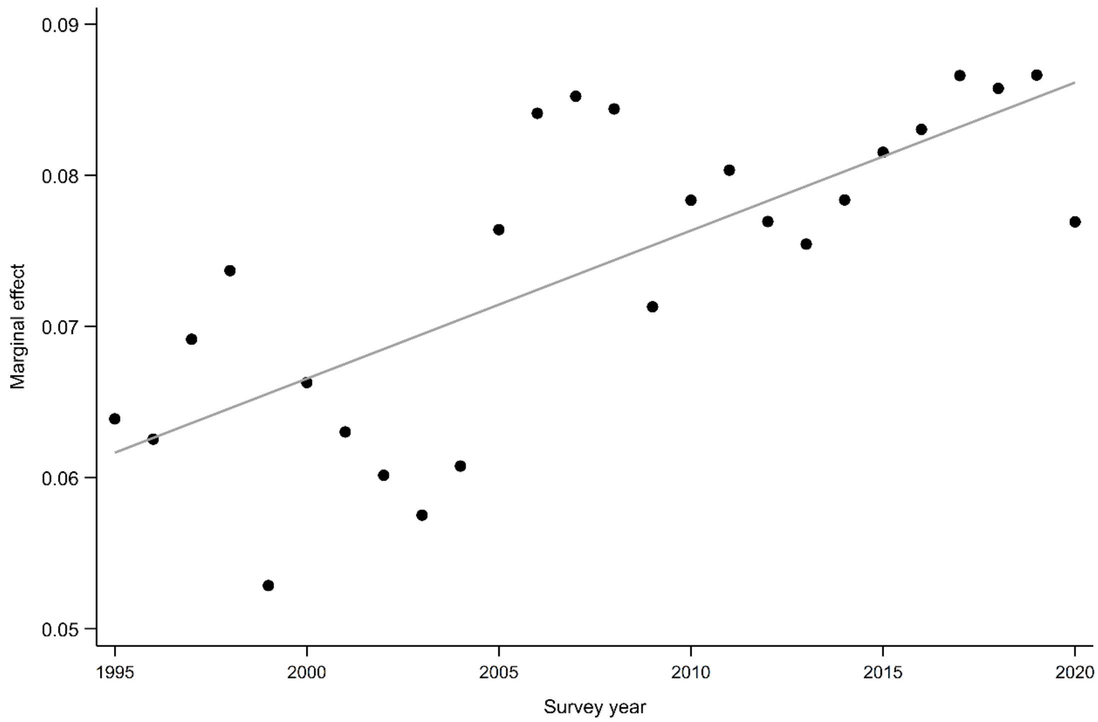
Table 5: The impact of a change in trade openness on the probability of having short, medium, and long-term job tenure, 1995-2020.

	Length of tenure (years)					
	Less than 1		5 to 10		More than 10	
Sub-samples	Coeff.	*Std. Error*	Coeff.	*Std. Error*	Coeff.	*Std. Error*
			Change in trade openness			
Total	3.846**	*1.267*	2.129	*1.522*	-0.050	*3.397*
Gender						
Males	4.907***	*1.290*	2.097	*1.432*	-1.266	*3.360*
Females	2.669**	*1.283*	2.154	*1.753*	1.252	*3.697*
Education						
Lower-secondary	3.991**	*1.644*	1.587	*1.750*	2.092	*3.744*
Upper-secondary	4.342***	*1.310*	1.761	*1.614*	0.438	*3.532*
High: Third level	2.829**	*1.131*	3.467	*1.608*	-2.334	*2.965*
Age						
30-40	3.761***	*1.333*	2.426	*2.205*	1.507	*4.083*
40-50	2.622***	*0.903*	1.873	*1.745*	-0.050	*3.500*
50+	1.733**	*0.671*	1.198	*1.401*	-1.551	*2.828*
			Technological change			
Total	1.605*	*0.938*	1.898*	*0.969*	0.979	*2.808*
Gender						
Males	1.458	*0.929*	0.746	*0.907*	0.893	*2.741*
Females	1.725*	*0.979*	3.271**	*1.149*	0.767	*3.071*
Education						
Lower secondary	1.014	*1.171*	1.899**	*1.115*	-0.306	*3.096*
Upper secondary	1.913**	*0.964*	2.666**	*1.067*	1.052	*2.941*
High: Third level	1.575*	*0.846*	1.218	*1.039*	1.757	*2.329*
Age groups						
Age 30-40	1.269	*0.982*	3.372**	*1.452*	1.438	*3.453*
Age 40-50	0.831	*0.662*	1.248	*1.147*	1.426	*2.815*
Age 50+	0.855*	*0.487*	1.392	*0.931*	0.025	*2.161*

Note: Coefficients and standard errors are estimated by panel regression of 26 marginal effects of the year dummies estimated on subsamples of 29 countries on the linear time trend and the annual change in trade openness (measured as imports + exports as a share of GDP) and the technological change measured as annual growth rate in the per capita ICT capital stock. Marginal effects are derived from estimation of the probability of a worker having one of three durations of job tenure. Estimation of the probability of a worker having less than one year of job tenure is conducted on a sample of respondents 20 and older. The probability of a worker having 5–10 years of tenure is estimated on a sample of respondents 25 and older. The probability of having tenure of more than 10 years is estimated on a sample of workers 30 and older. Bootstrapped standard errors. *** indicates that the coefficient is significant at 1% level, ** - at 5% level, * - at 10% level.

APPENDIX

Figure A1: Marginal effects by year of the survey.



Note: this figure plots the marginal effects for the estimated probability of job tenure being less than one year for the total sample. The fitted line is the OLS estimation with the coefficient 0.098 corresponding to the first coefficient in Table 3. EU-LFS 1995-2020.

Table A.1 – countries included in the analysis sample and subregional grouping

Subregion	Country
Central Europe and the Baltic countries	Bulgaria
	Croatia
	Czech Republic
	Estonia
	Hungary
	Latvia
	Lithuania
	Poland
	Romania
	Slovak Republic
	Slovenia
Northern Europe	Denmark
	Finland
	Iceland
	Norway
	Sweden
Southern Europe	Cyprus
	Greece
	Italy
	Portugal
	Spain
Western Europe	Austria
	Belgium
	France
	Ireland
	Luxembourg
	Netherlands
	Switzerland
	United Kingdom

Table A2: Estimated Yearly Percentage Point Trends for three tenure categories controling for the business cycle. 1995-2020.

	Length of tenuare (years)					
	Less than 1		More than 5		More than 10	
Sub-samples	Coeff.	*Std. error*	Coeff.	*Std. error*	Coeff.	*Std. error*
Total	0.114***	*0.018*	0.054	*0.039*	-0.253***	*0.038*
Gender						
Males	0.097***	*0.019*	0.076**	*0.037*	-0.276***	*0.039*
Females	0.134***	*0.018*	0.025	*0.044*	-0.221***	*0.038*
Education						
Lower-secondary	0.087***	*0.021*	0.070	*0.042*	-0.288***	*0.044*
Upper-secondary	0.108***	*0.019*	0.053	*0.037*	-0.249***	*0.036*
Tertiary	0.142***	*0.017*	0.037	*0.043*	-0.177***	*0.031*
Age groups						
30-40	0.120***	*0.018*	0.071	*0.058*	-0.249***	*0.052*
40-50	0.090***	*0.012*	0.119**	*0.035*	-0.308***	*0.034*
50+	0.064***	*0.008*	0.051	*0.020*	-0.182***	*0.022*
Sub-regions						
Central Europe	-0.129**	*0.042*	0.147***	*0.035*	0.035	*0.039*
Northern Europe	0.167***	*0.028*	0.032	*0.048*	-0.492***	*0.029*
Southern Europe	0.017	*0.024*	0.084	*0.050*	-0.144**	*0.040*
Western Europe	0.223***	*0.022*	-0.005	*0.046*	-0.280***	*0.050*

Note: Coefficients and standard errors are estimated from a linear regression of 26 marginal effects of the year dummies on the linear time trend. Marginal effects are derived from estimation of the probability of a worker having one of three durations of job tenure. Estimation of the probability of a worker having less than one year of job tenure is conducted on a sample of respondents older than 20. The probability of a worker having 5–10 years of tenure is estimated on a sample of respondents 25 and older. The probability of having tenure of 10 or more years is estimated on a sample of workers 30 and older. EU-LFS 1995-2020. Bootstrapped standard errors. *** indicates that the coefficient is significant at 1% level, ** - at 5% level, * - at 10% level.