

Valerija Botrić

Puzzling older workers' skills overconfidence in Mediterranean countries

Studeni • November 2025

Radni materijali EIZ-a • EIZ Working Papers



HR EXCELLENCE IN RESEARCH

Radni materijali EIZ-a
EIZ Working Papers
EIZ-WP-2501

**Puzzling older workers' skills overconfidence
in Mediterranean countries**

Valerija Botrić

Senior Research Fellow in Permanent Position
The Institute of Economics, Zagreb
Trg J. F. Kennedyja 7, 10 000 Zagreb, Croatia
E. vbotric@eizg.hr

This work was made as part of the project "Labour Markets and Well-being in the Context of an Ageing Population" at the Institute of Economics, Zagreb and funded within the National Recovery and Resilience Plan 2021-2026 – NextGenerationEU.

www.eizg.hr

Zagreb, November 2025

IZDAVAČ / PUBLISHER:

Ekonomski institut, Zagreb / The Institute of Economics, Zagreb
Trg J. F. Kennedyja 7
10 000 Zagreb
Hrvatska / Croatia
T. +385 1 2362 200
F. +385 1 2335 165
E. eizagreb@eizg.hr
www.eizg.hr

ZA IZDAVAČA / FOR THE PUBLISHER:

Ivana Rašić, ravnateljica / director

GLAVNA UREDNICA / EDITOR:

Ljiljana Božić

UREDNIŠTVO / EDITORIAL BOARD:

Ivan-Damir Anić
Tajana Barbić
Željka Kordej-De Villa
Toni Prug
Ivica Rubil
Sunčana Slijepčević
Paul Stubbs
Maruška Vizek

e-ISSN 1847-7844

Stavovi izraženi u radovima u ovoj seriji publikacija stavovi su autora i nužno ne odražavaju stavove Ekonomskog instituta, Zagreb. Radovi se objavljuju s ciljem poticanja rasprave i kritičkih komentara kojima će se unaprijediti buduće verzije rada. Autor(i) u potpunosti zadržavaju autorska prava nad člancima objavljenim u ovoj seriji publikacija.

Views expressed in this Series are those of the author(s) and do not necessarily represent those of the Institute of Economics, Zagreb. Working Papers describe research in progress by the author(s) and are published in order to induce discussion and critical comments. Copyrights retained by the author(s).

Contents

Abstract	4
Introduction	6
Literature review	7
Data and methodology	9
Results and discussion	13
Conclusions	16
References	18
Appendix	22

Puzzling older workers' skills overconfidence in Mediterranean countries

Abstract

The paper addresses the issue of skills gap in the context of ageing societies—specifically, the question of to what extent employees perceive the skills gap and whether there are differences between older workers and prime-age workers. The analysis is focused on the EU Mediterranean countries, which enables a comparative perspective, and also aims to compensate for the lack of empirical evidence encompassing smaller economies of the region. By relying on the European skills and jobs survey, it has been established that in most of the countries, prime-age workers are relatively more concerned about the potential inadequacy of their skills than the older workers (older than 55). The narrative remains the same when numerical, social, and technical skills gaps are concerned. While the gap is relatively small and not significant in all the countries, it is still contrary to the dominant narrative claiming lower skill levels of older workers. Decomposing the gap, by relying on the matching of observable characteristics, revealed that the compositional effect of these characteristics is important.

Keywords: older workers, skills gap

JEL classification: J14, J24

Jesu li u mediteranskim zemljama stariji radnici previše samopozdani?

Sažetak

Rad se bavi pitanjem jaza u vještinama u kontekstu starenja društava. Točnije, pitanjem u kojoj mjeri zaposlenici percipiraju jaz u vještinama i postoje li razlike između starijih radnika i radnika u najproduktivnijoj dobi. Analiza je usmjerena na mediteranske zemlje EU-a, što omogućuje komparativnu perspektivu, ali također ima za cilj nadoknaditi nedostatak empirijskih dokaza za manja gospodarstva regije. Oslanjajući se na Europsko istraživanje o vještinama i poslovima, utvrđeno je da su u većini zemalja radnici u najproduktivnijoj dobi relativno više zabrinuti zbog potencijalne neadekvatnosti svojih vještina nego stariji radnici (stariji od 55 godina). Narativ ostaje isti kada su u pitanju numeričke, socijalne i tehničke vještine. Iako je jaz u percepcijama starijih i radnika u najproduktivnijoj dobi relativno mali i nije statistički značajan u svim zemljama, on je i dalje u suprotnosti s dominantnim narativom da stariji radnici imaju niže razine vještina. Dekompozicija jaza, oslanjajući se na podudaranje uočljivih karakteristika, otkrila je da je kompozicijski učinak tih karakteristika snažan.

Ključne riječi: stariji radnici, jaz u vještinama

JEL klasifikacija: J14, J24

Introduction

The advanced ageing process in European economies prompted policymakers to advocate for national pensions systems' reforms (European Commission, 2008) and extension of working life (Léime et al., 2020). While a fiscal solution to ageing societies is clearly associated with the extension of working life, the implementation of this principle on the individual and national level is not straightforward and has been extensively discussed in the literature. One strain of the literature emphasizes the higher likelihood of health-related problems that older workers might encounter (Weber and Loicinger, 2022), which has the potential to decrease their productivity due to absenteeism (Viviani et al., 2021). These studies are contrasted by the findings that longer working lives and postponement of retirement decisions are associated with health improvements (Baxter et al., 2021), at least in certain occupations. Another strain of literature argues that older workers frequently lack adequate skills, which is a consequence of technology advancements prompting hasty labour market changes that render obsolete some of the skills adult workers gained during their working life (OECD, 2024). Empirical findings seem to corroborate the opinion that older workers have lower skills, as they generally obtain lower numeracy, literacy, and problem-solving scores than younger individuals (Paccagnella, 2016). Both arguments are consistent with findings that employers hesitate to hire or retain older workers due to age stereotypes or proclaim the need for workplace accommodations (OECD, 2025).

The Eurostat data, however, indicates that activity and employment rates of older workers in the EU are increasing at a faster rate than the rates of prime-age workers, suggesting that the extension of working-life policies is taking effect. Mediterranean countries have mixed results: while some outpace the average (Malta, Italy, and France), others lag according to this labour market indicator (Cyprus, Croatia, Spain, and Greece). Since the literature suggests that negative employers' perceptions of the skills and productivity of the older workers are one of the reasons for their decreased employment, this paper focuses on exploring this issue, but from the employee's perspective. Specifically, the paper contributes to the literature exploring the extent to which perceived or real older workers' skills gap presents a challenge when contemplating a longer working life in these countries. To achieve this, the analysis is closely related to McGuinness and Staffa (2025), who, by relying on the same data source, explore the incidence of skills gap in European countries. The authors find that perceived skills gaps are concentrated in more complex jobs, associated with higher productivity and high wages.

Our findings suggest that, in most of the analysed countries, with the exception of Cyprus, older workers are less likely to perceive their skill gap than prime-age workers. Furthermore, relative overconfidence of the older workers in their skills is significant in Croatia, France, Malta, and Spain. The matching exercise based on observable characteristics significantly contributed to the explanation of the gap; however, the compositional differences (i.e., the differences in observable characteristics) were more important than the returns to observable characteristics in most countries.

The paper adopts the following structure. The next section briefly summarizes related literature. Section 3 presents the methodology and the data used. Section 4 contains the results and the discussion, while the last section provides conclusions and recommendations for future research.

Literature review

Many countries are faced with the consequences of an ageing society, a collective result of declining fertility rates, aging baby boomers, and longer life expectancies (Zacher, Kooij, and Beier, 2018). The process is expected to have a wide impact on the world of labour and the topic of working life extension, which explains why it became a central policy theme in many countries (Phillipson, 2019). The most prominent discussions were related to the willingness and the capability of the older workers to continue actively participating in the labour market beyond the existing current statutory retirement age, with public discussions frequently emphasizing the adverse effects of a longer working life. Indeed, policymakers' efforts to announce increases in the statutory retirement age frequently met fierce opposition (Naumann, 2014). However, recent labour market shortages persuaded employers to support the fiscal argument and increasingly recruit older workers (Conen, Henkens, and Schippers, 2011; Riekhoff et al., 2024). This has significantly contributed to the activation of the older individuals, resulting in significant changes in the labour markets of the new member states and southern EU (Causa et al, 2025). The evidence reveals that, regardless of the initial reluctance to the statutory retirement age increases, a favourable institutional and business environment setting can encourage individuals to prolong their working life.

Theoretical predictions, based on the choice theory, envisage rational and forward-looking individuals who allocate their work and leisure to optimize the present value of lifetime sources of income (Gustman and Steinmeier, 1985). Within that framework, it can be clearly documented that institutional change disrupts previously planned retirement decisions. Ajzen (1988) offers a framework for conceptualizing the impact of this disruption, explaining that individual decisions are based on the following types of beliefs: (a) behaviour beliefs; (b) normative beliefs; and (c) control beliefs. Behaviour beliefs are related to the individuals' subjective values, i.e., whether the benefits of remaining in the labour market are more valued than alternative uses of time in retirement. The main drivers of behaviour beliefs are different values individuals ascertain to alternative time use (Twenge et al., 2010). Normative beliefs are related to social norms and can vary significantly between socio-economic groups: for example, it could be more socially acceptable that people with higher education, whose jobs are less likely to be physically demanding, work longer (D'Addio, Keese and Whitehouse 2010). Control beliefs consist of all the factors affecting the decision-making process, such as working conditions, family situation, personal health, and different retirement options. The latter factors are frequently analysed in the empirical studies. For example, adverse health effects are frequently named as one of the reasons against increased statutory retirement age by the

opponents of the process (Ardito et al., 2020; Carrino, Glaser, and Avendano, 2020), although some studies find positive effects of longer working life on health (Baxter et al., 2021), when controlled for favourable working conditions. Another example is the role of institutional settings, such as the notion that older workers have preferences towards more flexible working arrangements (Albinowski, 2024), thereby keeping the balance between the attachment to the labour market and (decreased) physical capabilities. In the situation when the labour market institutional setting does not accommodate their preferences, their optimal choices differ. Indeed, it has been shown that increasing the statutory retirement age can be accompanied by an increase in the share of disability claims (Atalay and Barrett, 2015; Cribb, Emmerson and Tetlow, 2016). The higher number of disability claims is clearly an adverse reaction by the individuals not perceiving the benefits of working longer.

Another recently emphasized factor influencing the control beliefs is the effect of rapid digitalization (Acemoglu and Autor, 2011; Frey and Osborne, 2017). Studies have explored significant changes in the demand for specific jobs and skills, establishing that, as the automatability of a specific job increases, the probability that the workers will perceive staying in the labour force longer as beneficial decreases (Lee, 2024). Older workers are more likely to be affected by the labour market digitalization, both because their digital skills accumulated during their working life are generally lower than the younger workers (Bua et al., 2025; Komp-Leukkunen et al., 2022) and because they are less likely to receive training (Posthuma and Campion, 2009). While some argue that it is not entirely clear whether the older workers would be willing to participate in training (McNair, 2006), others suggest that part of the difference should be attributed to the need for different training methods for older workers in comparison to younger workers (Picchio, 2021), which is seldom acknowledged in practice. Regardless of the underlying reasons, employers frequently perceive older workers as lacking adequate skills and the capacity to swiftly upgrade their skills.

The perceptions of the skills gap between employers and employees can differ significantly. One explanation why this occurs is connected to Becker's (1962) investment in human capital theory. Due to the fast changes in the demand for different skills on the labour market, the theory foresees the need for constant upskilling, i.e., the necessity of life-long learning. However, in the case of older workers, the timeframe for enjoying the benefits of investment in education is shorter, leading to a lower overall return on investment, which might influence both the employers' and older employees' willingness to invest in training. However, the future dynamic of changes in the labour market and the actual demand for skills is unknown in advance, which is more likely to act as an upskilling pressure for workers than for employers. Workers are more inclined to consider this argument when making a decision to invest in training, because of the fear that their existing skills could become obsolete before they reach statutory retirement age. Employers, on the other hand, are likely to assess that training older workers is associated with higher costs and lower overall benefits and redirect the funds towards the younger employees. This creates an upfront difference in the perception of the upskilling and reskilling capacity, which is, unfortunately, also connected to the older workers' discrimination.

The employers' discrimination against older workers has been well documented in the literature (Oude Mulders et al., 2014). Specifically, studies show that older workers with the same qualifications and experience are less likely to be called back for interviews than younger workers (Neumark, Burn and Button, 2019; Carlsson and Eriksson, 2019). Employers' unwillingness to hire older workers has been attributed to their concern about the productivity decline towards the end of the working life, which is supposed to be positively correlated with age-related decreasing cognitive skills (Picchio, 2021). However, empirical studies rarely find evidence of direct productivity differences between older and younger workers (van Dalen, Henkens, and Schippers, 2010). The studies that do find a relationship between age and job performance are usually narrowly focused on very specific tasks and activities (Ng and Feldman 2008). It is unresolved whether this concern for productivity differences between older and younger workers is justified by their differences in skills or whether it can be attributed solely to discrimination.

Recently, McGuinness and Staffa (2025), by analysing the skill gap that the workers perceive across the EU, conclude that the majority of European workers seem to possess the skills to meet the basic requirements of their job, yet in order to perform their job in a more optimal way, they express the need for upskilling. This desire for upskilling is above the EU average in most EU Mediterranean countries, with the exception of Italy and, to a lesser extent, Cyprus. To supplement these findings, the present paper explores the differences in skill gap perceptions between the older and prime-age workers. Furthermore, we explore the extent to which these differences can be attributed to the observable characteristics of the two groups.

Data and methodology

Following McGuinness and Staffa (2025), the analysis in the paper is based on the individual data from the second wave of the European skills and jobs survey (ESJS), which was carried out in 2021¹. The data collected for the survey is focused on adult (older than 25) employed persons, and for our purposes, we form two subsamples – prime-aged workers (aged 25-54) and older workers (aged 55-64). We restrict the sample to employees only, i.e., we exclude self-employed people because their perceptions of skills deficiencies and the possibilities for skills upgrading are very likely to be influenced by different factors.

The analysis is focused on Mediterranean countries. This implies that the following EU member states were considered: Croatia, Cyprus, France, Greece, Italy, Malta, and Spain. The reason for this choice is that comparative studies frequently focus only on the largest Southern European economies (Greece, Italy, Spain, and Portugal), whose labour markets shares certain similarities in the aftermath of the Great Recession (Bulfone and Tassinari, 2021, Moreira et al., 2015).

¹ For more information on the survey please consult <https://www.cedefop.europa.eu/en/projects/european-skills-and-jobs-survey-esjs>.

By shifting the focus to the Mediterranean, we specifically aim to also include smaller economies in the analysis, whose labour market changes repeatedly go under the radar.

The analysis is focused on the perceived skills gap, which is a dependent variable. Following McGuinness and Staffa (2025), we form a dummy variable that takes the value 1 if a person's response to the question '*To what extent do you need to further develop your overall level of knowledge and skills to do your main job even better?*' is '*great extent*'². Also, similar to McGuinness and Staffa (2025), we examine the perceived gaps in numeracy, social, or technical skills if a person responded positively (i.e., 'yes') to the question: '*Do you feel the need to further develop any of the following skills to do your main job even better?*'. The Survey is conducted utilizing computer-assisted telephone interviewing (CATI) and computer-assisted web interviewing (CAWI) methods, and some questions are only asked in the CAWI. Due to the reduced sample size, perceptions of skills gap in numeracy, social, and technical skills are not observed for Cyprus and Malta.

To search for a deeper understanding of the differences in skills gap perceptions between the two subgroups, we rely on the nonparametric matching decomposition technique developed by Ñopo (2008). The methodology assumes that, among the two analysed groups, we can identify individuals with similar characteristics (i.e., matched), and the initial assumption is that the outcome for the individuals with similar characteristics should be the same. Thus, the technique first matches the individuals in two subgroups, and subsequently decomposes the gap into four categories: (i) due to compositional differences between the groups in matched characteristics, (ii and iii) due to unmatched units in each group – denoting how much of the raw gap is due to the unmatched individuals having disproportionately higher or lower outcome than the matched individuals in the same group, and (iv) unexplained gap. In the form of an equation:

$$D = D_0 + D_X + D_A + D_B$$

The classic decompositions, such as Blinder-Oaxaca, are performed only on the matched sample and result in explained (D_X) and unexplained (D_0) components (see also Hamjediers and Spengholz, 2023). With the Ñopo technique, we can also discuss contributions to the gap that are not restricted by the 'common support', such as the average gap between unmatched and matched individuals within group A, weighted by the relative frequency of unmatched A units (D_A). It denotes how much of the raw gap is due to unmatched A units having higher or lower skills gap perceptions than matched A units. Subsequently, if we encounter that $D_A < 0$, we can establish that the skills gap perceptions are lower among the unmatched; if $D_A > 0$, the skills gap perceptions are lower among the matched. Similarly, D_B is the average gap between matched and unmatched units within group B, weighted by the relative frequency of unmatched

² Other possible answers are '*moderate extent*', '*small extent*' or '*not at all*'.

B units³. Clearly, this indicates that the matching procedure is crucial for the decomposition. However, as Nopo (2008) emphasizes, when it comes to the choice of the explanatory variables, the procedure is not straightforward: while we strive to explain the gap with the observable factors, the likelihood of matching decreases.

For the analysis in the present paper, the following set of explanatory variables was included in the matching procedure:

- Sex. This variable is a staple in labour market analysis and frequently reveals adverse position of women in the labour market. While there is no a priori reason to assume that women's perceptions of the skills gap should be different, there are numerous behavioural, normative, and control beliefs affecting the differences in decision-making processes between men and women. For example, women are more likely to assume caring roles, which is one of the reasons for higher rates of their early retirement, and in their prime working age, they are more likely to experience career breaks. This could influence their decision-making process, as their choice of potential outcomes of the decision process is wider. The dummy variable taking the value 1 if a respondent is female is included to capture gender differences. The numbers of non-binary persons are relatively small in the dataset and not equally distributed across the analysed countries. Therefore, these observations are not included in the empirical analysis.
- Educational attainment. Across the analysed countries, there is a higher probability that younger cohorts will have higher educational attainment (Mäcken et al., 2022; Riekhoff and Kuitto, 2024). The data enables distinction between three categories – lower secondary or below, upper secondary or post-secondary non-tertiary, and tertiary, colloquially arranged as low, medium, and high. However, as in some of the countries, the share of individuals with low educational attainment is relatively small in the sample, only the dummy variable depicting high educational attainment is included in the matching.
- Degree of urbanization. Represents the characteristics of the local labour market, such as the stronger labour demand in larger cities. For the matching purposes, a dummy variable depicting whether a respondent is a resident of a large town or a city is included.
- Skill-occupation categories. Perspectives on the skills gap can widely differ depending on the individual's existing skill levels, as significant changes in the demand for upskilling are seldom linear across the economy (Martinaitis, Christenko, and Antanavičius, 2020; Modestino et al., 2023). While a more fine-grained introspection into specific occupations would provide a more comprehensive overview of the impact, bearing in mind the size of the sample in some of the analysed countries, this approach would soon lead to the 'curse of dimensionality'. Instead, to incorporate the occupational perspective into the matching, this aspect was included in a fairly general way. The dataset already provides a link between each occupation and the related expected skill level, providing four categories: skilled, semi-skilled, manual, or

³ The empirical analysis is performed in STATA utilizing the 'nopo' command (Sprengholz and Hamjediers, 2024a). Please also see Sprengholz and Hamjediers (2024b) for application.

elementary. Due to the relatively small shares of the category ‘elementary’ and to some extent ‘manual’, only two dummy variables depicting whether the occupation is considered as ‘skilled’ or ‘semi-skilled’ are included in the matching.

- Private sector employment (as opposed to public, NGO, or joint public-private sector). The need for reskilling in the private or public sector can be perceived differently by the employers as well as by the employees, then in the public sector, due to the nature of the services provided to the customers. Furthermore, due to budgetary constraints, opportunities for investment in human capital in the public sector could be scarcer, which could be connected to less frequent but more intense upskilling episodes. To account for this potential impact, a dummy variable taking the value 1 if the respondent is employed in the private sector is included in the matching.
- The size of the company. Here, we distinguish between micro and small (up to 49 employees) and medium-sized and large (more than 50 employees). The rationale for including this factor is that small-sized firms usually have more limited resources for educational purposes (Kmecová and Androniceanu, 2024). To the extent that employees in small companies are aware of the market pressures and demands, they could be more aware of the skill gap (Bishop, 2012). To incorporate this effect, we include a dummy variable taking the value 1 if a respondent is employed by a large firm, i.e. more than 50 employees.
- Organisational changes. We include the dummy variable taking value 1 if there have been changes in the organization the respondent works in (for example, new management methods, new working methods, new digital technologies, new products or services, changes of location). The rationale for inclusion of this variable is that such changes could significantly influence the need for reskilling (Horbach and Rammer, 2021). Thus, if employees are facing increased demand for the new skills, their perceived skills gap could be higher.
- Type of contract. If a person is employed on a temporary basis or with a fixed-term contract, it is less likely that she will be interested in additional education related to that job. A similar argument is also valid in the case of employers, who are more likely to invest in additional skills acquisition for their employees with open-ended contracts (Koster, 2024). To control for this, we include a dummy variable capturing whether a respondent is employed on an indefinite basis (as opposed to having a fixed-term or no contract at all).

As can be noticed from the list, most of the variables are normally used in the analysis of labour market outcomes. Furthermore, they mostly belong to the ‘economic’ sphere, and do not include other personal characteristics that might influence an individual’s perceptions. The descriptive statistics of the variables used in matching are presented in Table A1 in the Appendix. It is important to note that these are sample characteristics, so they are not weighted to represent the population.

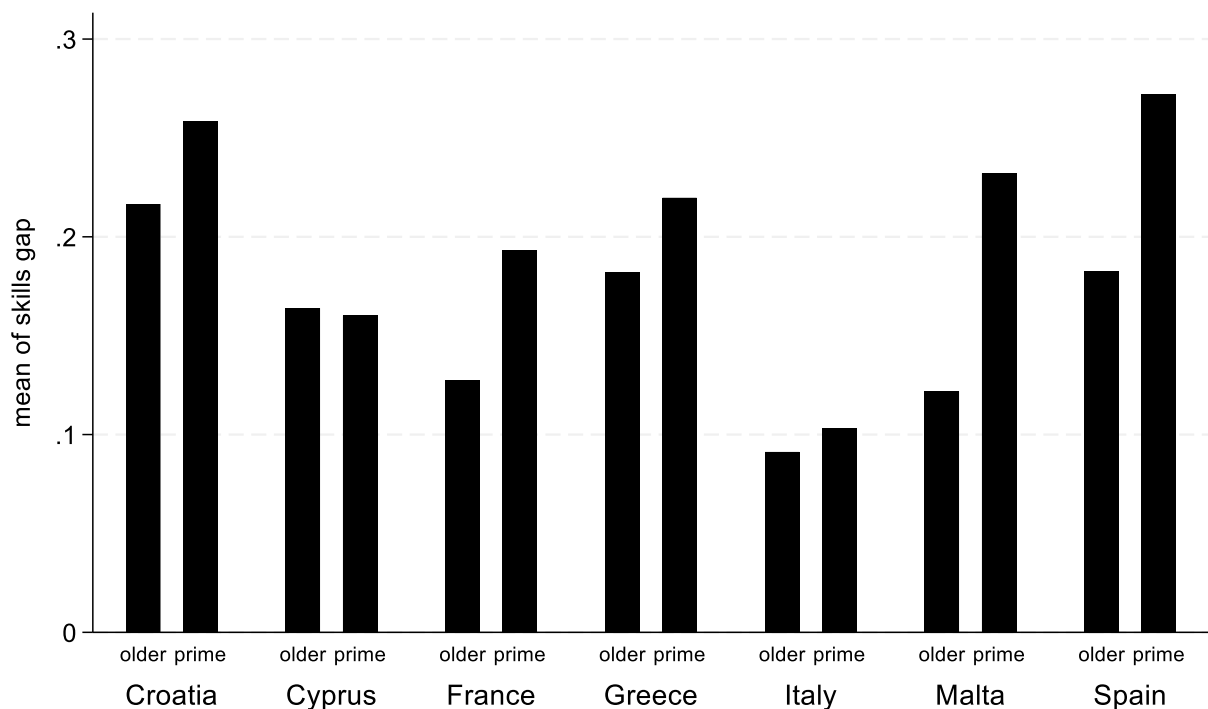
The results of the analysis based on this empirical strategy are presented in the following section.

Results and discussion

We start by presenting different measures of perceived skills gaps. To that end, the average overall skills gap perceptions of prime-age and older workers are presented in Figure 1.

It is interesting to note that skill deficiencies are more perceived by prime-age workers than older age workers across the analysed countries, except for Cyprus. Thus, the perceptions of the skills gap are contrary to the PISA results, which generally find that the skills of prime-age workers outperform those of older workers. The same is also across all the specific skills gap segments – numerical, social, and technical – where prime-age workers are on average more concerned for the adequacy of their skills (Figures A1, A2, and A3 in the Appendix). The evidence clearly shows that in most analysed countries, older workers are more satisfied with their skills, and they find their skill levels to a greater extent suitable for their jobs than prime-age workers. It is also interesting to note that among the prime-age workers, those in Spain and Croatia expressed the greatest concern for the adequacy of their skills, while the least concerned seem to be the workers in Italy.

Figure 1 Perceived skills gap of prime-age and older workers in Mediterranean countries

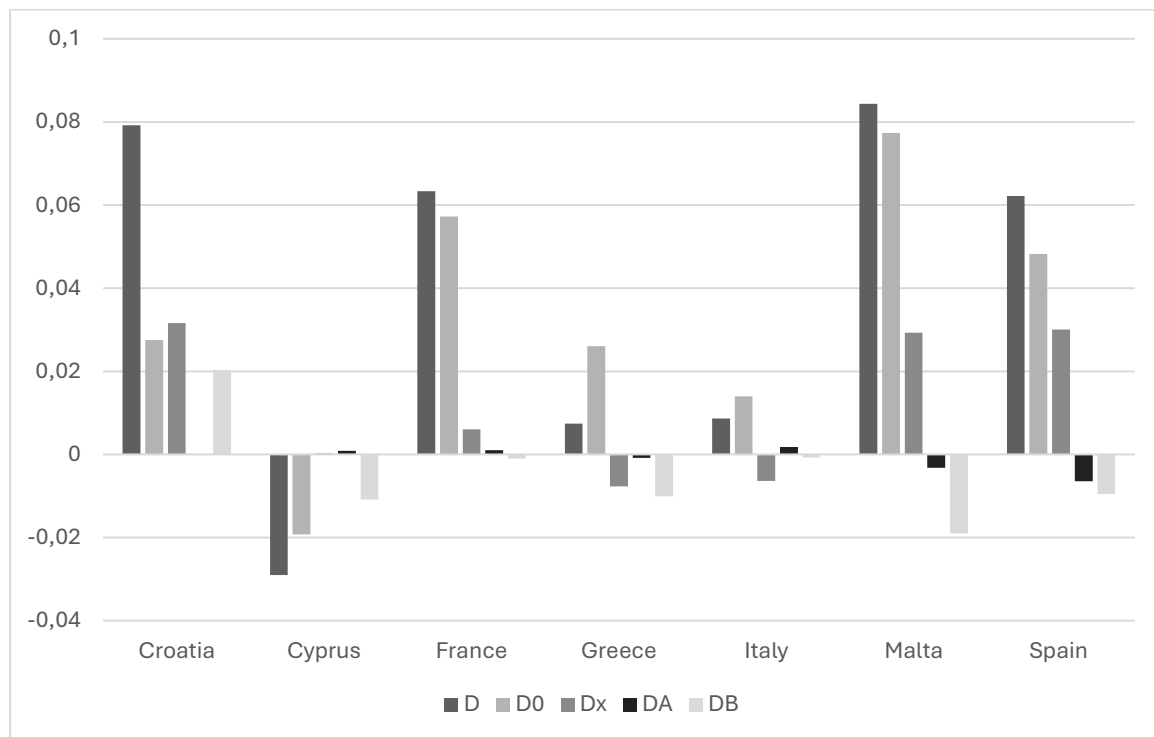


Source: Author based on the ESJS dataset.

To shed light on these differences in skills gaps perceptions, we explore whether it could be explained by the differences in observed characteristics between older and prime-age workers. To that end, we decompose the difference in skill perception gaps into four components as explained in the methodology section. The main results of the 1000 bootstrapped decompositions are summarized in Figure 2 and Table A2 in the Appendix.

First, it has to be acknowledged that the estimates of the difference in skill perception gaps and the components of the decomposition in many cases are not significant. This is particularly the case for Greece and Italy, where the identified difference was smaller, and in Cyprus, where it was negative. So, the first conclusion is that this relative overconfidence of the older workers in their skills is not universal across the countries, but it is stronger (and significant) in Croatia, France, Malta, and Spain.

Figure 2 Decomposition of the difference in skills gap perception between older and prime-age workers



Source: Author's estimates based on ESJS.

Notes: D – raw gap, D_x – explained among the matched, D_0 – unexplained among the matched, D_A – due to unmatched in A (older workers), D_B – due to unmatched in B (prime-age workers).

The explained component (D_x) of the skill perception gap, i.e., the difference of the skill gap between reweighted group B (in our case, prime-age workers) and group B, explains 39.8% of the raw difference in skill perception gap in Croatia, 48.3% in Spain (where this component is also significant), 34.7% in Malta and 9.5% in France. This implies that each characteristic is

found in each subsample, but with a different frequency. So, if the prime-age workers had similar observed characteristics as the older workers, the skills perception gap in most countries would be smaller. It is interesting to note that for Greece, Italy, and Cyprus, the difference in skill perception gap in this case would increase.

In most countries, however, the unexplained component (D_0) on the common support is the strongest, which is a residual after all other parts of the gap – on and off the common support – are identified. This is not surprising, since the observable characteristics include only ‘economic’ variables and not other important factors, such as health or personality traits. It is interesting to note that, since other components contribute positively and negatively to the explanation of the gap perception, the unexplained component exceeds the identified perception gap in Greece and Italy, two countries where the overall identified difference in skill perception gaps is small.

It should be emphasized that the decomposition presented here relies on exact matching, and the percentage of matched individuals was relatively high, in particular for the older workers⁴. The results in Table A3 of the Appendix reveal that the skills gap perceptions of the matched and unmatched older workers are relatively similar. Subsequently, the contribution of the D_A , which represents the gap between perceptions of matched and unmatched older workers, is relatively small across the countries.

There is relatively more influence of the D_B , i.e., the difference between matched and unmatched prime-age workers. The contribution of this component is, however, in most countries, except for Croatia and Cyprus, negative. For Croatia and Cyprus, this component contributed with 25.6% and 37.5% to the overall difference in skills perception gap. This suggests that the skills gap perceptions of prime-age workers for most of the countries are lower among the unmatched than among the matched (Table A3 in the Appendix). The unmatched prime-age workers are less likely to perceive that they need additional skills to successfully perform their job in most of the countries, except for Croatia.

Since the exercise utilizes exact matching, it is interesting to observe the compositional differences between matched and unmatched subsamples of older and prime-age workers. In other words, which observable characteristics differ the most between the matched and unmatched individuals (Table A3 in the Appendix). For example, if we focus on the differences in the characteristics of the reweighted and matched prime workers, we can discuss the compositional effects leading to the explained gap (D_X). In countries where this component explains the gap (Croatia, France, Malta, and Spain), generally, there is a higher share of highly educated prime-age workers and those working in high-skill occupations in the matched sample than in the reweighted sample. Clearly, this is an indication that skills perceptions are related to the types of jobs, which are generally related to educational attainment. However, a deeper

⁴ Exact matching was also performed without bootstrapping. Propensity score matching was also used, but the overall results were not qualitatively different. The difference was that with the propensity score matching, in some of the countries, 100% of older workers were matched, leading to a further decrease of the components not on the common support.

understanding would require a more detailed analysis of the educational composition, which is data-demanding.

When we focus on the difference between matched and unmatched prime workers (DB), we can again identify a relatively large difference in the composition of those working in high-skill occupations and, in some countries, those with permanent contracts.

While the analysis in this paper revealed some interesting findings, there are a number of limitations that have to be emphasized. The most important one is that the identified skills gap perception is not statistically significant in all the analysed countries. Subsequently, more detailed analysis can be considered only as an indication and not a firm conclusion. However, having in mind prejudices against the skills, productivity, and capacity to adopt new skills of older workers, this study clearly points to the need for deeper future research on this topic.

Conclusions

Based on the recently proposed measure of a self-perceived skill gap (McGuinness and Staffa, 2025), the paper explored the differences in this indicator between older and prime-age workers in Mediterranean countries. The focus on the older workers and their (potential) skills deficiencies is justified by the omnipresent discussion on the effects and consequences of ageing societies. The rationale for analysing Mediterranean EU countries is supported by their frequent appearance in headline unemployment discussions, thereby suggesting suboptimal functioning of the labour markets. Having in mind the favourable assessment of the Mediterranean lifestyle for increased overall quality of life, the scarcity of literature on older workers (benefits or barriers) in these countries is surprising. The paper adopts a comparative approach, analysing individual EU Mediterranean countries, thereby also including the smaller, frequently omitted from discussions, economies.

Contrary to traditional skills gap estimates, based on ‘objective’ measures such as PISA results, the subjective measure applied in this paper revealed that older workers do not necessarily perceive the need to upgrade their skills. Indeed, across the analysed countries, apart from Cyprus, the older workers are less likely to claim that they need additional skills to successfully complete their jobs. The effect is not large; indeed, it is significant in four out of seven countries and may not be persistent. However, the existence of a lower perceived skills gap for older than prime-age workers in some of the countries in the presence of the dominant narrative of lower older workers’ overall productivity certainly calls for additional research on the topic.

Matching exercise performed on the observable ‘economic’ characteristics confirmed that they do contribute to the partial explanation of the differences in perceptions on skill gap between older and prime-age workers. The exercise, however, also pointed to the large role of the ‘unexplained’ component, which is likely to be related to factors such as personal health and personality traits, which have been documented as important factors in making a retirement

decision. So, it is highly likely that they will also affect the individual's perception regarding their skill relevance for the labour market. These factors are also highly likely to influence an individual's willingness to undertake additional educational activities. Possible policy measures in this domain should be designed considering a wider spectrum of factors; the underlying analysis should not rely only on the 'economic' variables.

The analysis in this paper is not likely to close the discussion on the topic. Instead, it aims to encourage further research. The key message is that this complex issue should be analysed by taking a multidimensional approach. This is particularly important when considering that policy measures in the domain of longer working life promotion are likely to affect large populations.

References

- Acemoglu, D., & Autor, D. (2011). Chapter 12—Skills, tasks and technologies: implications for employment and earnings, In D. Card & O. Ashenfelter (Eds.), *Handbook of Labor Economics Vol.4*, 1043-1171. Elsevier, the Netherlands.
- Ajzen, I. (1988). *Attitudes, Personality and Behaviour*. Open University Press, UK.
- Albinowski, M. (2024). Part-time employment opportunities and labour supply of older workers. *The Journal of the Economics of Ageing*, 28, 100504.
- Ardito, C. Leombruni, R., Blane, D. & d'Errico, A. (2020). To Work or Not to Work? The Effect of Higher Pension Age on Cardiovascular Health. *Industrial Relations: A Journal of Economy and Society*, 59(3), 353-499.
- Atalay, K., & Barrett, G. F. (2015). The Impact of Age Pension Eligibility Age on Retirement and Program Dependence: Evidence from an Australian Experiment. *Review of Economics and Statistics*, 97(1), 71-87.
- Baxter, S., Blank, L., Cantrell, A., & Goyder, E. (2021). Is working in later life good for your health? A systematic review of health outcomes resulting from extended working lives. *BMC Public Health*, 21, 1356.
- Becker, G.S. (1962). Investment in Human Capital: A Theoretical Analysis. *Journal of Political Economy*, 70(5), 9-49.
- Bishop, D. (2012). Firm size and skill formation processes: an emerging debate. *Journal of Education and Work*, 25(5), 507-521.
- Bua, I., Pastori, S., Minelli, E., & Afeltra, G. (2025). Digital Skills for Senior Workers: A Systematic Review. Available at: <http://dx.doi.org/10.2139/ssrn.5195523>
- Bulfone, F., & Tassinari, A. (2021). Under pressure. Economic constraints, electoral politics and labour market reforms in Southern Europe in the decade of the Great Recession. *European Journal of Political Research*, 60, 509-538.
- Carlsson, M., & Eriksson, S. (2019). Age discrimination in hiring decisions: Evidence from a field experiment in the labor market. *Labour Economics*, 59, 173-183.
- Carrino, L., Glaser, K., & Avendano. M. (2020). Later Retirement, Job Strain, and Health: Evidence from the New State Pension age in the United Kingdom. *Health Economics*, 29(8), 891-912.
- Causa, O., Soldani, E., Nguyen, M., & Tanaka, T. (2025). Labour shortages and labour market inequalities. *OECD Economic Department Working Papers*, No. 67.

- Conen, W., Henkens, K., & Schippers, J. (2011). Are employers changing their behavior toward older workers? An analysis of employers' surveys 2000–2009. *Journal of Aging & Social Policy*, 23(2), 141-158.
- Cribb, J., Emmerson, C., & Tetlow, G. (2016). Signals Matter? Large Retirement Responses to Limited Financial Incentives. *Labour Economics*, 42, 203-212.
- D'Addio, A. C., Keese, M., & Whitehouse, E. (2010). Population ageing and labour markets. *Oxford Review of Economic Policy*, 26(4), 613-635.
- European Commission. (2018). *The 2018 Ageing report: economic and budgetary projections for the EU Member States (2016–2070)*, Institutional Paper No. 79. Brussels, Belgium.
- Frey, C. B., & Osborne, M. A. (2017). The future of employment: how susceptible are jobs to computerisation? *Technological Forecasting and Social Change*, 114, 254-280.
- Gustman, A. L., & Steinmeier, T. L. (1985). The 1983 Social Security Reforms and Labor Supply Adjustments of Older Individuals in the Long Run. *Journal of Labor Economics*, 3(2), 237-253.
- Hamjediers, M., & Sprengholz, M. (2023). Comparing the Incomparable? Issues of Lacking Common Support, Functional Form Mis-Specification, and Insufficient Sample Size in Decompositions. *Sociological Methodology*, 53(2), 344-365.
- Horbach, J., & Rammer, C. (2021). Skills shortage and innovation. *Industry and Innovation*, 29(6), 734-759.
- Kmecová, I., & Androniceanu, A. (2024). Level of investments in human capital in SMEs as a means of further development and increased competitiveness. *Journal of Competitiveness*, 16(1), 79-95.
- Komp-Leukkunen, K., Poli, A., Hellevik T., Herlofson, K., Heuer A., Norum, R., Solem, P.E., Khan, J., Rantanen, V., & Klingebiel, A.M. (2022). Older workers in digitalizing workplaces: a systematic literature review. *The Journal of Aging and Social Change*, 12(2), 37-59.
- Koster, F. (2024). What about us? A vignette study explaining training preferences by contract type and skill specificity. *International Labour Review*, 163(2), 225-245.
- Léime, A.N., Ogg, J., Rašticová, M., Street, D., Krekula, C., Bédiová, M., & Madero-Cabib, I. (eds.) (2020). *Extended Working Life Policies: International Gender and Health Perspectives*. Cham: Springer.
- LePine, J. A., Erez, A., & Johnson, D. E. (2002). The nature and dimensionality of organizational citizenship behavior: A critical review and meta-analysis. *Journal of Applied Psychology*, 87, 52-65.
- Linville, P. W., Fischer, G. W., & Salovey, P. (1989). Perceived distributions of the characteristics of ingroup and out-group members: Empirical evidence and a computer simulation. *Journal of Personality and Social Psychology*, 57, 165-188.

- Mäcken, J., Präg, P., Hess, M., & Ellwardt, L. (2022). Educational Inequalities in Labor Market Exit of Older Workers in 15 European Countries. *Journal of Social Policy*, 51(2), 435-459.
- Martinaitis, Ž., Christenko, A., & Antanavičius, J. (2020). Upskilling, Deskillling or Polarisation? Evidence on Change in Skills in Europe. *Work, Employment and Society*, 35(3), 451-469.
- McGuinness, S., & Staffa, E. (2025). Measuring the Incidence and Impacts of Skill Gaps Among European Workers. *IZA DP No.* 17993.
- McNair, S. (2006). How different is the older worker labour market? Attitudes to work and retirement among older people in Britain. *Social Policy and Society*, 5(4), 485-94.
- Modestino, A.S., Burke, M.A., Sadighi, S., Sederberg, R., Stern, T., & Taska, B. (2023). No longer qualified? Changes in the supply and demand for skills within occupations. *IZA Discussion Paper Series*, No. 16542.
- Moreira, A., Domínguez, Á. A., Antunes, C., Karamessini, M., Raitano, M., & Glatzer, M. (2015). Austerity-Driven Labour Market Reforms in Southern Europe: Eroding the Security of Labour Market Insiders. *European Journal of Social Security*, 17(2), 202-225.
- Naumann, E. (2014). Raising the retirement age: retrenchment, feedback and attitudes. In Kumlin, S. & Stadelmann-Steffen, I. (eds.): *How Welfare States Shape the Democratic Public*. 223-243. Cheltenham, UK: Edward Elgar Publishing.
- Neumark, D., Burn, I., & Button, P. (2019). Is It Harder for Older Workers to Find Jobs? New and Improved Evidence from a Field Experiment. *Journal of Political Economy*, 127(2), 922-970.
- Ng, T. W. N., & Feldman, D. C. (2008). The relationship of age to ten dimensions of job performance. *Journal of Applied Psychology*, 93, 392-423.
- Ñopo, H. (2008). Matching as a tool to decompose wage gaps. *The Review of Economics and Statistics*, 90(2), 290-299.
- OECD (2025). OECD Employment Outlook 2025: Can We Get Through the Demographic Crunch?, OECD Publishing, Paris, <https://doi.org/10.1787/194a947b-en>.
- OECD (2024). OECD Employment Outlook 2024: The Net-Zero Transition and the Labour Market, OECD Publishing, Paris, <https://doi.org/10.1787/ac8b3538-en>.
- Oude Mulders J., van Dalen, H.P., Henkens, K., & Schippers, J. (2014). How likely are employers to rehire older workers after mandatory retirement? A vignette study among managers. *De Economist*, 162, 415-431.
- Paccagnella, M. (2016). Age, Ageing and Skills: Results from the Survey of Adult Skills. *OECD Education Working Papers*, No. 132.

- Phillipson, C. (2019). 'Fuller' or 'extended' working lives? Critical perspectives on changing transitions from work to retirement. *Ageing & Society*, 39(3), 629-650.
- Picchio, M. (2021). Is training effective for older workers? *IZA World of Labor*, No. 121.
- Posthuma, R., & Campion, M. (2009). Age Stereotypes in the Workplace: Common Stereotypes, Moderators, and Future Research Directions. *Journal of Management*, 35, 158-188.
- Riekhoff, A., Järnefelt, N., Laaksonen, M., & Liukko, J. (2024). Labour shortages and employer preferences in retaining and recruiting older workers. *International Journal of Manpower*, 45(4), 838–863.
- Riekhoff, A., & Kuitto, K. (2024). Educational Expansion as a Driver of Longer Working Lives? Regression Decomposition Analysis of Changes in Labour Force Participation at Older Ages in Twenty-first Century Europe. *Comparative Population Studies*, 49, 141-168.
- Sprengholz, M., & Hamjediers, M. (2024). NOPO: Stata module to perform Nopo (2008) matching decompositions. *Statistical Software Components S459289*, Boston College Department of Economics.
- Sprengholz M., & Hamjediers, M (2024b). Intersections and Commonalities: Using Matching to Decompose Wage Gaps by Gender and Nativity in Germany. *Work and Occupations*, 51(2), 249-286.
- Twenge, J. M., Campbell, S. M., Hoffman, B. J., & Lance, C. E. (2010). Generational Differences in Work Values: Leisure and Extrinsic Values Increasing, Social and Intrinsic Values Decreasing. *Journal of Management*, 36(5), 1117-1142.
- van Dalen, H.P., Henkens, K., & Schippers, J. (2010). Productivity of Older Workers: Perceptions of Employers and Employees, *Population and Development Review*, 36(2), 309-330.
- Verkuyten, M., & Nekuee, S. (1999). Ingroup-bias: the effect of self-stereotyping, identification and group threat. *European Journal of Social Psychology*, 29, 411-418.
- Viviani, C. A., Bravo, G., Lavallière, M., Arezes, P. M., Martínez, M., Dianat, I., Bragança, S., & Castellucci, H. I. (2021). Productivity in older versus younger workers: A systematic literature review. *WORK: A Journal of Prevention, Assessment & Rehabilitation*, 68(3), 577-618.
- Weber, D., & Loicinger, E. (2022). Live longer, retire later? Developments of healthy life expectancies and working life expectancies between age 50–59 and age 60–69 in Europe. *European Journal of Ageing*, 19, 75-93.
- Zacher, H., Kooij, D., & Beier, M. E. (2018). Active aging at work. *Organizational Dynamics*, 47(1), 37-45.

Appendix

Table A1 Descriptive statistics

Country	Croatia		Italy		Spain		Greece		Malta		France		Cyprus	
Worker	prime	older	prime	older	prime	older	prime	older	prime	older	prime	older	prime	older
Skill gap	26.8	18.9	20.9	15.9	28.5	22.3	21.9	21.2	24.6	16.1	19.5	13.2	17.9	20.8
Female	54.0	63.8	48.6	47.8	47.5	42.2	50.1	39.7	54.2	53.4	49.3	49.6	43.6	41.6
Rural	57.5	53.5	58.1	61.6	55.1	58.3	29.0	23.9	59.6	52.2	74.2	76.1	46.1	41.6
Urban	42.5	45.9	41.8	38.1	44.9	41.7	71.0	76.1	39.4	46.0	25.8	23.7	53.9	58.4
Edu_L	1.3	0.5	11.4	20.8	9.8	17.1	1.8	2.2	15.4	32.9	21.0	38.7	2.2	4.0
Edu_M	40.2	49.2	32.4	38.7	31.4	36.5	31.1	28.8	35.4	40.4	26.5	30.0	21.0	27.7
Edu_H	58.3	50.3	56.1	40.4	58.7	46.4	67.1	69.0	48.1	25.5	52.4	31.3	76.8	68.3
Skilled	60.9	63.8	53.6	54.3	47.4	48.1	46.6	64.1	63.8	46.6	57.7	55.9	66.2	65.3
Semi-skilled	21.4	17.8	30.1	28.9	34.5	34.7	40.7	24.5	20.8	27.3	23.6	26.5	20.3	20.8
Manual	12.5	10.3	10.1	10.9	10.7	10.4	7.6	8.2	10.1	13.7	11.3	13.4	10.0	9.9
Elementary	4.5	6.5	5.0	5.5	6.4	6.7	4.2	2.7	5.1	12.4	4.8	3.8	3.2	4.0
Permanent contract	81.6	86.5	78.7	86.4	77.0	87.1	72.3	77.2	75.9	78.9	86.2	88.5	75.1	79.2
Large_firm	36.1	39.5	47.0	50.3	48.6	52.1	37.8	41.3	55.9	43.5	55.9	56.9	33.7	36.6
Private sector	52.9	46.5	66.6	55.1	69.7	62.3	69.7	52.2	56.4	49.7	61.1	53.8	76.9	57.4
Org. change	71.7	67.6	73.7	68.8	78.6	69.5	76.3	78.3	77.0	71.4	69.8	63.4	58.1	55.4
N	816	185	11889	2138	2606	403	1819	184	842	161	2487	524	900	101

Source: Author based on ESJS dataset.

Table A2 Bootstrapped decompositions

	D	D ₀	D _x	D _A	D _B
Croatia	0.079** (0.032)	0.027 (0.044)	0.032 (0.023)	-0.000 (0.015)	0.020 (0.018)
Italy	0.009 (0.014)	0.014 (0.018)	-0.006 (0.009)	0.002 (0.004)	-0.001 (0.004)
Spain	0.062** (0.023)	0.048* (0.027)	0.030** (0.014)	-0.006 (0.005)	-0.010 (0.007)
Greece	0.007 (0.031)	0.026 (0.041)	-0.008 (0.019)	-0.001 (0.008)	-0.010 (0.012)
Malta	0.084** (0.032)	0.077 (0.047)	0.029 (0.030)	-0.003 (0.017)	-0.019 (0.018)
France	0.063*** (0.016)	0.057*** (0.020)	0.006 (0.011)	0.001 (0.003)	-0.001 (0.005)
Cyprus	-0.029 (0.042)	-0.019 (0.057)	0.000 (0.034)	0.0014 (0.021)	-0.011 (0.019)

Source: Author based on the ESJS dataset.

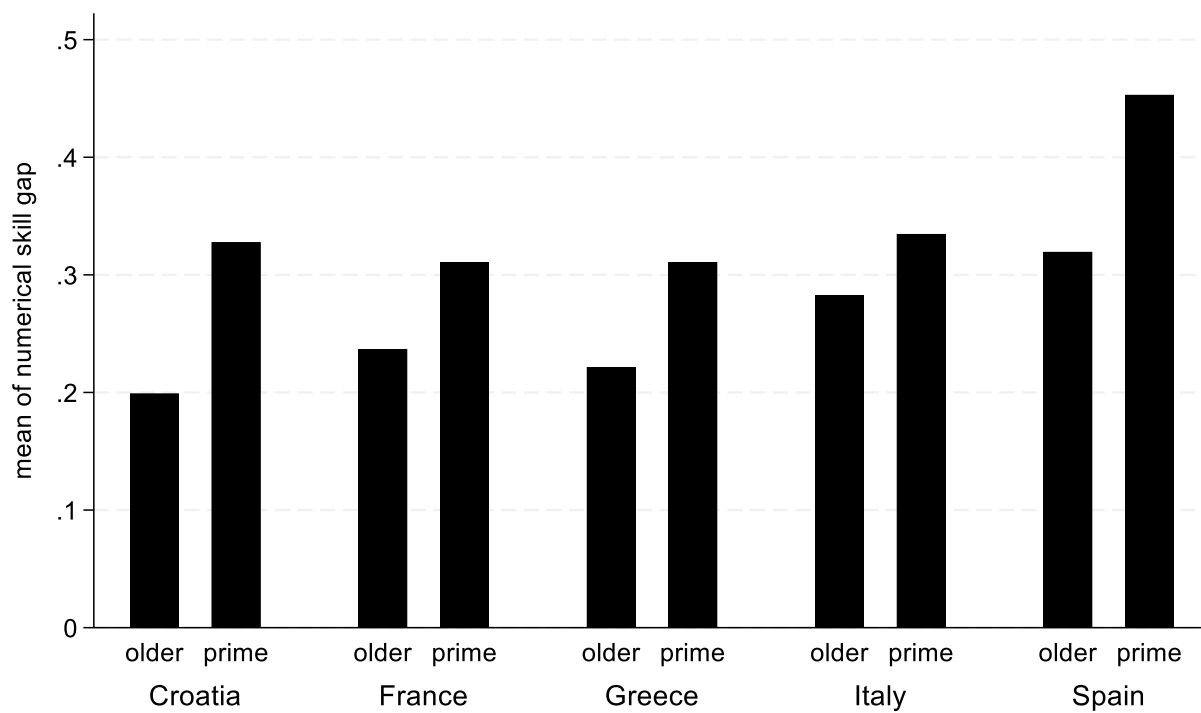
Table A3 Descriptive statistics by matching status

	A-unmatched	A-matched	B-weighted	B-matched	B-unmatched
	Croatia				
Skill gap - mean	0.190	0.189	0.217	0.248	0.304
Skill gap - st. Dev.	0.402	0.393	0.412	0.432	0.461
Female	0.762	0.622	0.622	0.604	0.429
Edu_H	0.238	0.537	0.537	0.619	0.520
Urban	0.524	0.451	0.451	0.338	0.490
Private sector	0.714	0.433	0.433	0.504	0.574
Org. change	0.429	0.707	0.707	0.783	0.601
Permanent contract	0.571	0.902	0.902	0.906	0.659
Skilled	0.143	0.701	0.701	0.758	0.348
Semi-skilled	0.286	0.165	0.165	0.135	0.355
Large_firm	0.476	0.384	0.384	0.36	0.446
	Cyprus				
Skill gap - mean	0.200	0.209	0.190	0.190	0.167
Skill gap - st. Dev.	0.422	0.409	0.392	0.393	0.373
Female	0.500	0.407	0.407	0.375	0.501
Edu_H	0.300	0.725	0.725	0.87	0.657
Urban	0.300	0.615	0.615	0.684	0.381
Private sector	0.400	0.593	0.593	0.791	0.745
Org. change	0.300	0.582	0.582	0.646	0.510
Permanent contract	0.900	0.78	0.780	0.902	0.587
Skilled	0.400	0.681	0.681	0.846	0.462
Semi-skilled	0.200	0.209	0.209	0.102	0.313
Large_firm	0.500	0.352	0.352	0.328	0.346
	France				
Skill gap - mean	0	0.133	0.190	0.196	0.190
Skill gap - st. Dev.	0	0.340	0.392	0.397	0.393
Female	0.250	0.498	0.498	0.488	0.519
Edu_H	0.250	0.313	0.313	0.504	0.625
Urban	0.250	0.237	0.237	0.224	0.432
Private sector	0.250	0.540	0.540	0.631	0.509
Org. change	0.250	0.637	0.637	0.726	0.556
Permanent contract	0.500	0.888	0.888	0.927	0.531
Skilled	0	0.563	0.563	0.630	0.304
Semi-skilled	0.750	0.262	0.262	0.219	0.321
Large_firm	0.500	0.569	0.569	0.559	0.558
	Greece				
Skill gap - mean	0.250	0.211	0.237	0.229	0.207
Skill gap - st. Dev.	0.50	0.409	0.426	0.421	0.406
Female	0	0.406	0.406	0.442	0.571
Edu_H	0.250	0.700	0.700	0.756	0.571
Urban	0.250	0.772	0.772	0.837	0.561
Private sector	0.500	0.522	0.522	0.694	0.699

Org. change	0.500	0.789	0.789	0.859	0.650
Permanent contract	0.250	0.783	0.783	0.807	0.625
Skilled	0.250	0.650	0.650	0.613	0.291
Semi-skilled	0.250	0.244	0.244	0.302	0.532
Large_firm	0.750	0.406	0.406	0.357	0.402
	Italy				
Skill gap - mean	0	0.104	0.117	0.111	0.108
Skill gap - st. Dev.	0	0.305	0.322	0.314	0.310
Female	0.200	0.477	0.477	0.427	0.581
Edu_H	0.400	0.314	0.314	0.371	0.640
Urban	0.500	0.281	0.281	0.252	0.438
Private sector	0.100	0.570	0.570	0.708	0.723
Org. change	0.300	0.730	0.730	0.781	0.677
Permanent contract	0.600	0.909	0.909	0.893	0.402
Skilled	0.100	0.521	0.521	0.530	0.415
Semi-skilled	0.500	0.335	0.335	0.326	0.388
Large_firm	0.300	0.542	0.542	0.515	0.338
	Malta				
Skill gap - mean	0.182	0.158	0.236	0.265	0.215
Skill gap - st. Dev.	0.395	0.366	0.425	0.442	0.411
Female	0.455	0.547	0.547	0.543	0.539
Edu_H	0.091	0.281	0.281	0.463	0.511
Urban	0.500	0.453	0.453	0.357	0.455
Private sector	0.273	0.532	0.532	0.568	0.558
Org. change	0.591	0.734	0.734	0.846	0.645
Permanent contract	0.636	0.813	0.813	0.871	0.576
Skilled	0.182	0.511	0.511	0.681	0.567
Semi-skilled	0.364	0.259	0.259	0.165	0.277
Large_firm	0.273	0.460	0.460	0.589	0.511
	Spain				
Skill gap - mean	0.455	0.217	0.265	0.295	0.255
Skill gap - st. Dev.	0.522	0.413	0.441	0.456	0.436
Female	0.545	0.418	0.418	0.458	0.532
Edu_H	0.364	0.467	0.467	0.588	0.585
Urban	0.545	0.413	0.413	0.444	0.465
Private sector	0.091	0.638	0.638	0.751	0.523
Org. change	0.455	0.702	0.702	0.828	0.652
Permanent contract	0.545	0.880	0.880	0.890	0.384
Skilled	0.636	0.477	0.477	0.524	0.311
Semi-skilled	0.273	0.349	0.349	0.324	0.411
Large_firm	0.636	0.518	0.518	0.501	0.439

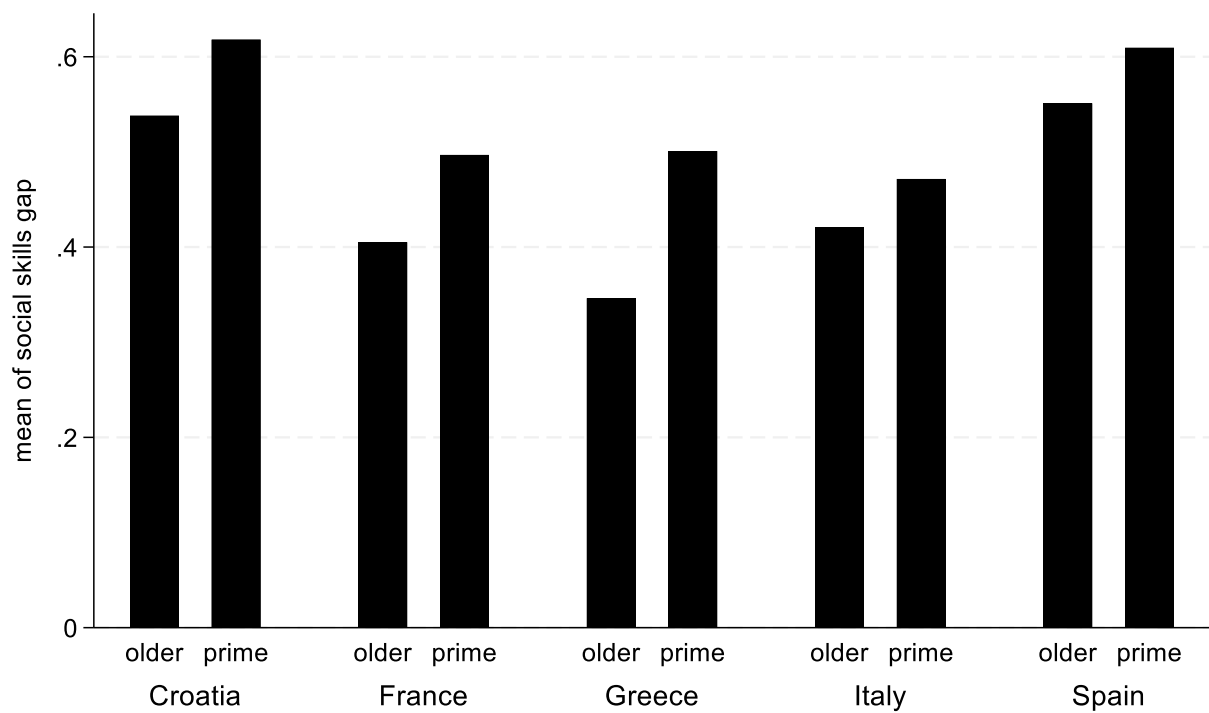
Source: Author based on the ESJS dataset.

Figure A1 Perceived numerical skills gap of prime-age and older workers in Mediterranean countries



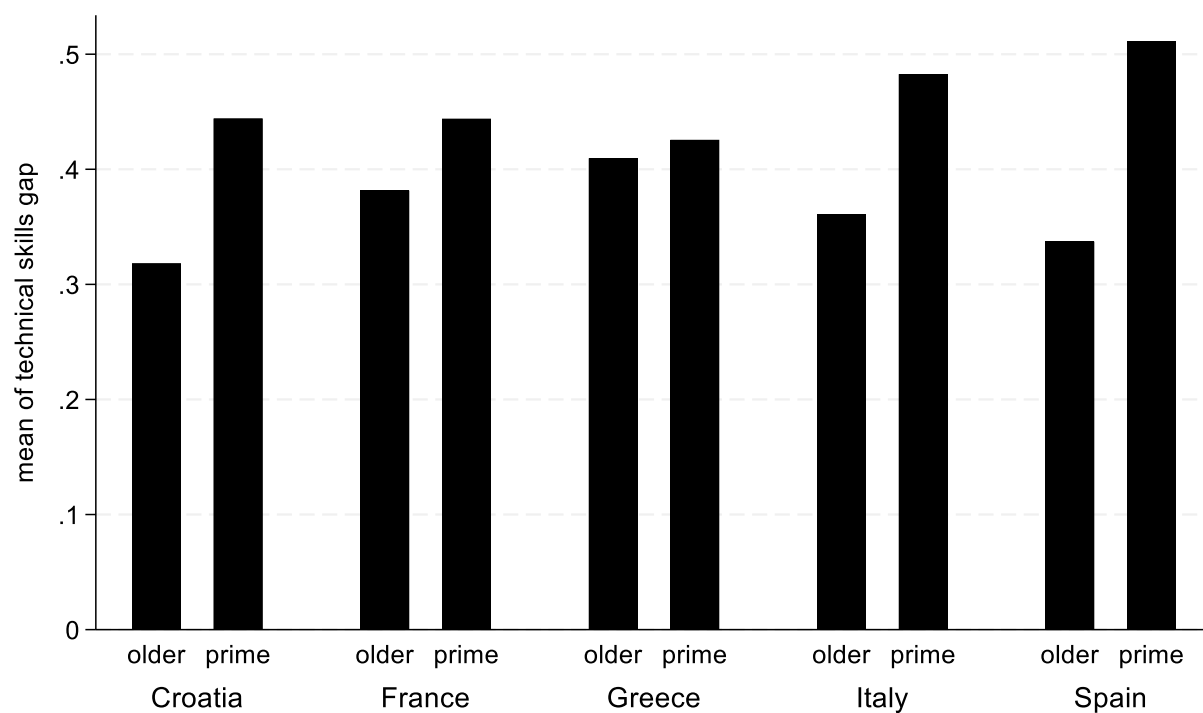
Source: Author based on the ESJS dataset.

Figure A2 Perceived social skills gap of prime-age and older workers in Mediterranean countries



Source: Author based on the ESJS dataset.

Figure A3 Perceived technical skills gap of prime-age and older workers in Mediterranean countries



Source: Author based on the ESJS dataset.

