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The right skills for silver workers

An empirical analysis

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Foreword

Matching skills and jobs is at the heart of current education, training and employment policies in the European Union (EU). Next to investment in skills, knowledge and competences, matching the skills of Europe's citizens with employer needs is increasingly recognised as crucial for economic recovery and long-term growth.

To reflect more systematically on the implications of future trends in skill demand and supply, Cedefop has launched a new line of research focusing on skill mismatch. After setting priorities for skill mismatch research in 2008 (Cedefop, 2009) and a general review of various aspects of skill mismatch (Cedefop, 2010), this report is the first publication on mismatch that presents new empirical work.

It deals with skill mismatch among ageing workers. Not only is population ageing a dominant trend in the EU, but ageing workers are one of the groups particularly affected by skill mismatch. The report features detailed empirical analyses of the impacts of skill mismatch for ageing workers and compares them with younger and prime-age workers. It discusses the determinants of different types of mismatch and provides a comprehensive analysis of its impacts on wages, job satisfaction, career and employment prospects and health. Although the report presents important new insights, it also uncovers some future research opportunities to strengthen analysis of skill mismatch.

The empirical analyses in this report use several waves of the European working conditions survey (EWCS), carried out by the European Foundation for the Improvement of Living and Working Conditions (Eurofound). The EWCS has extensive coverage and is one of few data sets to contain questions on skill mismatch. Despite EWCS not being intended for analysing skill mismatch specifically, it enables a good initial understanding of job matching in Europe and the distinct situation of ageing workers.

Analysing skill matching of ageing workers in Europe offers a new perspective on the problems and challenges facing them. Results clearly indicate the need to take skill mismatch seriously and improve use of skills in the workplace as well as the role workplace conditions can play in better matching skills and jobs. We trust these results can help policy-makers make the case for human resource policies that take skill matching as a guiding principle.

Christian F. Lettmayr
Acting Director

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Executive summary

Employing ageing workers has become a major strand of European Union (EU) employment policy. Achieving this will be easier by extending current employment relationships as opposed to attracting back into the labour force older individuals who left the labour market. Ageing workers are particularly prone to skill obsolescence, which makes both strategies difficult to achieve. Computerisation is a prime example of the challenges facing them.

In this research paper, we examine to what extent mismatch affects ageing workers and reflect on the consequences of mismatch by addressing the following questions:

(a) are ageing workers confronted by different types of mismatch than younger workers;
(b) how has skill mismatch developed over time;
(c) are there different sector and country effects;
(d) does training help to reduce the mismatch problem;
(e) what is the impact of skill mismatch on wages, job satisfaction and other aspects of employment;
(f) what policy implications follow.

We define the ageing-worker age group as those aged 50 years and above and compare this group with those aged 15-29 and 30-49 respectively. Working conditions affect younger and ageing workers in different ways, with the latter less exposed to physical risks and high intensity work, but also less involved in new developments. Little is known about the role of skill mismatch with regard to its effects on different age groups, but various European working conditions surveys (EWCS) contain relevant questions on skill mismatch as well as skill obsolescence. In addition, the empirical method can be used to derive measures of educational mismatch.

As it is difficult to have a-priori ideas on the magnitude and direction of the effects of factors and contexts impacting on skill mismatch and on the impacts of mismatch, we approach the issues at hand in an explorative way. We combine an analysis of mismatch in Europe and changes over time with an econometric analysis of mismatch focused on determinants and impacts in 2005, before considering the policy implications of our findings.

Results show that ageing workers are less susceptible to overskilling than younger workers, which is consistent with obsolescence reducing their complement of skills. On the other hand, overeducation affects ageing workers more than younger workers. Undereducation is not more prevalent among ageing workers than among prime age workers, but older women are more prone to it

than older men. The perceived ability to work beyond the age of 60, which can be considered an indicator for the degree workers are confronted with skills obsolescence, is higher for ageing workers compared to prime age workers, for males and for those with degree-level qualifications.

Skill mismatch is a pervasive phenomenon in Europe. Based on 2005 data, less than half of those employed are matched for both skill and education over all countries. In 2005, Bulgaria, the Czech Republic and Lithuania had the highest proportion of workers matched for both education and skill at over 50 %. Less than 30 % of respondents were matched in Greece and Spain. Thus, skill mismatch, while being a common phenomenon, varies substantially across countries. Usually, the explanation is not to be found through differences in occupational and industrial structures. It is possible to examine the incidence of mismatch for 15 countries from 1995 to 2005. For overskilling, the relative position of countries changes over time. Underskilling is much less prevalent, but still subject to volatility.

There is no clear relationship between incidence of training and reduction of skill mismatch. Receiving training does not appear to lead to less underskilling. Another interesting finding is that while overeducated workers in general are more likely to receive training, this relationship is more muted for ageing workers. As in the case of training, there does not appear to be any clear relationship between high performance work practices and the incidence of mismatch.

Wage effects are more evident for educational mismatch than skill mismatch, with the overeducated earning significantly less than their matched equivalents and the undereducated significantly more. No wage effects were found for either overskilling or underskilling.

Job satisfaction, of those reporting themselves as very satisfied, has declined over time. Levels of satisfaction appear to be higher in northern Europe than in southern Europe. A similar divide is visible for the proportion of workers believing that they will be able to continue in work beyond the age of 60, with the Germans and those in the UK being among the most positive and the Greeks and Portuguese being among the least positive. However, the number of responses indicating that work beyond the age of 60 was unlikely generally declined between 2000/01 (the first year the question was asked) and 2005. Overskilled and underskilled workers are significantly less likely to be satisfied with their jobs than matched workers. Educational mismatch has for the most part no significant impact on job satisfaction.

Other results include the following. Overskilling is positively related to shift-working, demanding work and health problems, but negatively related to learning new things on the job and self-management. Underskilling is positively related to job learning and self-management, emphasising the need for additional training in challenging jobs. Further, career prospects of ageing workers are significantly

lower than those of younger workers and ageing workers are no more likely to fear job loss than younger workers, controlling for mismatch.

Another finding is that ageing workers are no more likely to report health problems than younger workers. This conclusion may, however, reflect a 'healthy worker effect' with workers having health problems leaving the workforce. For younger workers, health problems are linked to skill mismatch, while for ageing workers this is only the case for underskilling, possibly reflecting stress caused by this form of mismatch.

The evidence suggests that overeducation has detrimental effects on pay, but not on job satisfaction. Data do not support the conventional view that overskilling has a negative effect on pay, but we find evidence that overskilling is associated with lower job satisfaction. This implies that it is overskilling that should be of more concern to policy-makers. Another implication of the results is that employers may need to review the incidence of overskilling among their employees and attempt to reduce it through appropriate training promoting better use of skills and changes to job conditions, such as making jobs more challenging and providing workers with more challenging jobs and greater opportunities for self-management.

1. Introduction

Employing ageing workers has become a major issue in many countries faced with an ageing population and an increase in the old age dependency ratio (the ratio of those over 60/65 to those aged 15-59/64). Raising activity rates for older people is one way of offsetting these trends, while at the same time enabling workers to obtain additional income to sustain them post retirement as the expected life span increases.

Growing awareness of the need to expand labour market participation in the context of demographic change is not sufficient to ensure growth in skilled labour. There is also a need to maximise the use of such labour. The Europe 2020 strategy (European Commission, 2010b) emphasises the need to combine the development of workforce skills throughout life with better matching of labour supply and demand. According to a recent UK government white paper, 'There is no automatic relationship between skills and productivity. Critically important is how businesses actually use the skills of their workforce.' (BIS, 2009, p. 20).

The Scottish government went a stage further in its 2007 skills strategy by putting skill use at the centre of its policies. It notes that despite rising skill levels, and unlike in countries such as Germany, Finland and Sweden, there has not been an accompanying rise in the level of influence which employees report they can exercise in their jobs. It proposes to improve skills use in the workplace by human-resource practices encouraging job redesign and favouring autonomy, as well as by ensuring that employees use their skills in ways benefiting also employers. Suboptimal use of skills can also be reduced by offering employees greater challenges through, for example, providing them with a greater degree of self-management and enabling them to learn new things, although this can be constrained by the scope of their job.

As a recent EU report, *New skills for new jobs* (European Commission, 2010a) emphasises, there may also be a need for involving key intermediaries such as education and training providers and public employment services in determining how to improve skills use in the workplace, as well as improving employer cooperation networks for sharing information on good practices in skill use and development.

Literature on ageing and skill matching has not been sufficiently connected which hampers understanding of these issues. Therefore, in this research paper, we are interested in the determinants of skill mismatch among ageing workers and whether this differs from younger age groups and in the consequences of skill mismatch for job satisfaction and wages in particular. More specifically we address the following research questions:

(a) to what extent are ageing workers confronted by different types of skill mismatch (such as skill obsolescence) and in what regard does this differ from the types of mismatch facing younger workers both in Europe as a whole and in individual Member States;
(b) how has skill mismatch developed over time;
(c) which factors and contexts, at individual, job, organisational, sectoral and country levels, impact on skill mismatch and what is the nature of any relationships uncovered;
(d) to what extent do different types of training (according to who pays for it or whether onsite or off-the-job) contribute to the alleviation of skill mismatch or its impact on ageing workers;
(e) what are the impacts of different types of skill mismatch on wages, career advancement, job satisfaction, health conditions, assessment of being able to do the job when aged 60 and the probability of remaining employed;
(f) based on the results to research questions (a) to (e), what are the policy implications?

It is difficult to have a-priori ideas on the magnitude and direction of the effects of factors and contexts impacting on skill mismatch. One hypothesis carrying particular relevance for policies is that skill mismatch would be significantly lower in workplaces with high performance work practices (HPWPs). We would expect that training can alleviate skill mismatch to some extent, at least where training can make up for skills a worker is lacking. Furthermore, in general we would expect different types of mismatch to have an impact on different types of labour market outcomes, but the direction and magnitude of these effects depend on the type of outcome analysed and the specific mismatch workers find themselves in.

Given the nature of our research questions, we approach the issues at hand in an explorative way. We start by summarising the background and reviewing the most important existing literature. We then discuss the framework we apply to address these research questions and the data used, followed by an analysis of mismatch in Europe and changes over time and an econometric analysis of mismatch in 2005, before considering the policy implications of our findings.

2. Ageing and matching

According to the European Commission *Demographic report 2008* (2009), in 2007 around 50 % of men and 40 % of women were still in employment at the age of 60. These rates are low compared to those in other world regions, even though rates have increased by 10 percentage points since 2000, reversing the previous trend towards earlier retirement. The report on *Europe's demographic future* (European Commission, 2007) notes that according to Eurostat's baseline population projection the median age in the EU will increase between 2004 and 2050 from 39 to 49 years and the old age dependency ratio will rise from 0.37 to 0.70.

Scope for improvement in labour force participation also includes those over current retirement age, as the employment rate for 65 to 74 year olds was only 5.6 % in the EU in 2003, compared to 18.5 % in the US (European Commission, 2005). The Stockholm European Council 2001 implemented a target of a 50 % employment rate for older people aged 55-64 by 2010. The Barcelona European Council 2002 emphasised its importance suggesting that a progressive increase of about five years in the effective age at which people stop working should be sought by 2010. Yet only eight of 27 countries were above the 50 % target rate in 2008 with some countries such as Italy, Malta, Poland, Slovenia and Slovakia only achieving a rate of about 30 %. For women, the Stockholm Council, recognising that the participation rate of older women is lower than that of older men, set an employment target of 40 % by 2010. However, a report from the European Foundation for the Improvement of Living and Working Conditions (Eurofound, 2009) noted that large gender differences in employment rates of around 20 percentage points or more were present in Ireland, Greece, Spain, Italy and Cyprus while in Malta the gap was almost double. Also, older women workers are likely to work part-time and many are on temporary contracts. They are more likely than men to play a dual role of both working and caring and tend to retire earlier than their male colleagues.

Earlier work suggested it is easier to raise employment of ageing workers of either gender if employers and employees are persuaded of the advantages of extending current employment relationships rather than the State seeking new jobs for ageing workers who are no longer in employment. Hutchens (1986) found that in the US, though employers were prepared to continue to employ ageing workers, they were more reluctant to hire them, either for replacement or new posts, because of a tendency to backload compensation to induce sufficient long-term input of effort by the workforce. This means paying younger workers less than the value of their productivity to induce them to stay longer with the company and thereby obtain a better return on their investment, while ageing

workers are paid more than the value of their marginal product as part of the past inducement towards long-term employment relationships and confirming the commitment of the firm to long-term employees. The nature of such an internal labour market leads to a natural preference for younger workers in the hiring process. Further, jobs involving substantial specific training impose fixed costs on the firm making it optimal to hire young workers and hire infrequently, as long as it results in longer job tenure. Further, jobs with substantial general training requirements are more attractive to younger workers as they can capture the returns over a greater proportion of their working lives.

We must also consider the effect of skill obsolescence on ageing relative to younger workers. As outlined in Cedefop (2010), this may take several forms but the key question is whether and to what extent new technologies and organisational changes are biased against ageing workers. Physical (or technical) obsolescence corresponds to a reduction in the quantity of human capital, whereas economic obsolescence corresponds to a reduction in the market value of a given quantity of human capital. If the rate of skill obsolescence accelerates, the productivity of ageing workers may decline relative to that of younger workers, as a greater proportion of the competences of ageing workers will be affected. As Aubert et al. (2006) noted, both technological and organisational innovations may impact negatively on ageing workers because they each require a degree of adaptability, and as literature in cognitive sciences makes clear (Bosma et al., 2003), people generally become less adaptable with age. Thus, younger workers could be substituted for older workers, in more innovative firms, if younger workers with the necessary skills can be found. Using a sample of over 4 000 French manufacturing firms, Aubert et al. found evidence in support of this with the introduction of innovative devices lowering the wage bill share of ageing workers (aged 50-59) and increasing it for younger workers (aged 20-29), with the effect being stronger for women. The correlations are even greater when the focus is on inflows and outflows of labour, with a strong propensity for more innovative firms to hire younger workers but not necessarily to fire them, perhaps because of the need to retain some more experienced workers for reasons of work coordination. Similar studies to determine the extent to which these results can be generalised across various countries are lacking.

A particular form of technological change is computerisation. Friedberg (2003) noted that in the US the proportion of workers of all ages using a computer rose from 24 % in 1984 to 51 % in 1997, but those aged 60-64 were at the latter date 21 % less likely to use a computer than the average worker and computer users were significantly less likely to retire early than non-computer users. Dolton et al. (2007) reported, using workplace employment relations survey (WERS) 2004 data, that the percentage of British workers who use a computer falls from 84 % of those aged between 25 and 33 to 50 % of those aged 60 or

over. Women of all ages are more likely to use computers than men. Computerisation will affect ageing workers more severely than younger workers because of the shorter payback period from the investment in training, because they are less likely to have computer skills in the first place and because, on average, they have lower levels of education, which in turn increases the probability that they are in routine jobs with an increased likelihood of automation.

The European Foundation for the Improvement of Living and Working Conditions published a report in 2008 (Eurofound, 2008) recognising that it was important to monitor working conditions as workers approached retirement age to determine which factors lead to an early exit from the labour force and which factors are likely to extend working life. The report suggested that age is an important factor in describing working conditions with significant differences emerging between younger and older workers. Thus, compared to younger workers, ageing workers are less exposed to physical risks, enjoy more autonomy in their work and work at a lower degree of intensity, all of which will help to extend working life. However, ageing workers are less involved in new organisational work arrangements, training and acquiring new skills. It is not clear whether this reflects the type of work ageing workers do, lack of willingness from employers to give older workers new opportunities or lack of motivation from workers themselves. Yet, both age groups, relative to prime age workers, may suffer from forms of discrimination and to a lesser degree experience difficulties in accessing IT.

The 2008 Eurofound report does not consider in any detail skill mismatch, though this could be a core factor impacting on the ability of ageing workers to continue working both effectively and productively. Focusing directly on the relevance of skills to performance and the impact of imbalances between the skills possessed by workers and those required in the workplace can offer a unique perspective of the problems and challenges facing ageing workers, who may be faced with skills obsolescence. However, little is known about this phenomenon as evidence is scarce in Europe and elsewhere. One exception is a paper by Rubb (2009), who examined the effects of overeducation on wages and early retirement decisions of older workers using US census of population data. In this paper, overeducation is defined as a level of education which exceeds either the mode of educational attainment within an occupational category or the mean level of educational attainment plus one standard deviation. Older workers are split into two categories, those aged 55-61 (and, therefore, not eligible for social security benefits) and those aged 62-64 (eligible for such benefits). Overeducation is, in fact, slightly lower for the two groups of older workers than it is for those aged 25-54 and the impact on wages is very similar, while the impact on retirement decisions is small. An important consideration for some ageing workers is whether they have the possibility of moving from full-time to part-time

employment prior to retirement. Citing Ruhm (1990), Rubb suggested that overeducation might not reduce job satisfaction of older workers in such voluntarily chosen bridge jobs. Indeed, Ruhm found that, in the US, less than two in five workers retire directly from their career jobs.

De Grip et al. (2009) analysed the competences of pharmaceutical assistants in the Netherlands. This is an interesting case because the nature of work has changed from the preparation of drugs and medications to a heavier concentration on sales activities requiring more communication skills. Older pharmaceutical assistants are likely to have entered the occupation when the mix of activities was very different than it is today and are thus likely to be more skill mismatched and less satisfied than at least some younger colleagues. The dual nature of pharmacies in particular or the multiple nature of certain occupations more generally may explain why some workers report themselves as overskilled (such as for underusing acquired skills) and others underskilled (in so far as they are called upon to engage in activities for which they have had little or no training).

In this report we are concerned not just with the incidence of skill mismatch but also with its effects. As Cedefop's earlier report (Cedefop, 2010) demonstrated, skill mismatch can have negative effects on productivity, wages, labour turnover and job satisfaction. As de Grip et al. put it (with appropriate supporting references): 'workers' job satisfaction is highly important for the success and survival of firms. Low job satisfaction is associated with low performance, limited service quality and reduced customer satisfaction. Moreover, low job satisfaction can cause health complaints, and a higher staff turnover, creating substantial financial, social and psychological costs for workers, organisations and society.' (de Grip et al. 2009, p. 589).

Although the focus of this report is on ageing workers, the analyses are also carried out for the younger and middle age groups. This will give insight into the core differences between ageing workers and their younger colleagues and shed light on the ways these groups of workers differ in terms of skill matching.

3. Set-up of the analysis

3.1. European workplace conditions surveys

In this research paper we use the European working conditions surveys (EWCSs) conducted every four or five years. So far, four EWCSs have been carried out. In 1990/91, the survey covered the EU-12 Member States, though there were no questions on skill mismatch. In 1995/96, it covered the EU-15 Member States and a question on skill mismatch was added. In 2000, Norway was included too and a question on net monthly income from main paid job was added, enabling additional types of labour market analysis. Further questions were added on various aspects of the job, such as fear of job loss and career prospects. In 2001 the survey embraced the 12 candidate countries. The fourth major survey in 2005 included 31 countries, namely the 27 Member States, two candidate countries (Croatia and Turkey) and two EFTA countries (Switzerland and Norway).

The survey is based on a stratified random sample. Up to 2001 a random walk procedure was implemented in countries, while from 2005 onwards registers were used in all countries with sufficient reliability and coverage level were available. The eligible population are people of 15 years or older who carried out at least one hour of paid work in the week preceding the interview. Interviews were conducted face-to-face at respondents' homes.

The number of interviewed varied over time. In 2000, it added up to 21 703, around 1 500 per Member State, except for Luxembourg (527). In 2005, 29 680 workers were interviewed, but the number per country fell to around 1 000, except for Estonia, Cyprus, Luxembourg, Malta and Slovenia (around 600).

This has implications for our analysis. After an initial analysis it appeared that ageing workers needed to be defined as those aged 50 and over to have sufficient observations for regression analysis to be carried out in each country. For comparison purposes younger workers were defined as those aged 15-29 and prime-age workers as those aged 30-49. There is a sample selection problem as many young people aged 15-29 are still in the education system and these tend to be drawn from the upper part of the ability distribution. Likewise, some of the older-age group will have retired and these may include some whose skills became redundant, some suffering from poor health, some who were employed in declining industries and some who accumulated sufficient income to take early retirement. As non-participants in the labour market neither group will appear in our data set. Due to problems of small sample size in individual countries, national analyses by gender were not possible, though in all cases a gender dummy was included.

In 1995/96, response rates varied between 35 % in Denmark and 81 % in Austria; and in 2000 from 39 % in Ireland to 75 % in Germany. In 2005, the overall response rate was 48 % across all countries, varying from 32 % in Luxembourg and Switzerland to 67 % in Romania. Each survey provides a reliable comparison of working conditions across countries and when aggregated to the EU level it can be used to analyse working conditions according to different characteristics of employment or other factors.

The more recent surveys not only contain questions on skill matching, but also ask workers, who have not yet reached the age of 60, whether they think they will be able to do the same job when they are 60 years old. This particular question is highly relevant to the effects of skill obsolescence and/or the burden of work as workers age. However, we do not know whether respondents interpret this question to refer to their ability to perform the same tasks as they become older or to the availability of a market for these tasks in the future. In our regression analysis we exclude those jobs for which physical obsolescence might be relevant. Also, the surveys contain information on many ageing issues such as physical environment, hours and patterns of work (including shiftwork), organisational environment (including the pace of work and the degree of job discretion), social environment and the impact on health.

3.2. Questions on skill mismatch

In the 1995 and 2000/01 EWCS, workers were asked to assess the match between their skills and their job, a question that cannot be found in any other pan-European data source. The question was: ‘how well do you think your skills match the demands imposed on you by your job?’ There were four categories:

- the demands are too high;
- they match;
- the demands are too low;
- don’t know.

In 2005, this question was changed to ‘which of the following alternatives would best describe your skills in your own work?’ The alternatives are:

- I need further training to cope well with my duties;
- my duties correspond well with my present skills ;
- I have the skills to cope with more demanding duties.

While the first response in the 2005 survey seems to equate with underskilling or ‘the demands are too high’ in the earlier surveys and the second to the earlier matched response, the third is more problematic. This answer, ‘I have the skills to cope with more demanding duties’ could refer to the fact

individuals believe they are now ready for promotion or have additional skills not relevant to the current job, but could be used in another job. This, indeed, appears to be the case as the percentage responding positively is very much higher than in the earlier surveys, where the question is less general or open-ended. Yet the figures do not appear to be out of line with those derived from other surveys, such as the UK WERS 2004 and the UK skills surveys, suggesting that the figures in the earlier surveys are relatively low.

In the 2005 EWCS, the question on mismatch was intended as a fairly rough indicator of skill mismatch, to be used in the analysis of other aspects of working conditions. The new way of measuring mismatch was considered an improvement and was inspired by the use of similar questions in several national working conditions surveys. For ease of presentation the variable is interpreted as an actual state of match or mismatch in this research paper. It does not concern an objective assessment, but rather measures perceived levels of matching.

While the EWCS does not contain a specific question on overeducation, it is possible to construct a measure using the empirical method which compares the qualifications of individual workers with the modal level in their occupation (see also Cedefop, 2010).

The 2005 survey allows us to distinguish nine separate categories – on the one side of the mismatch equation those matched for both education and skills, the overeducated only, the overskilled only, and those who are both overskilled and overeducated, and on the other side the undereducated only, the underskilled only and those who are both undereducated and underskilled. This level of detail in analysing different states of mismatch is unique and not available in other European surveys.

3.3. Empirical analysis and techniques

The first part of the empirical analysis (Chapter 4) provides an assessment of various types of skill mismatch in Europe with particular focus on ageing workers and changes taking place in mismatch over time. The second part (Chapter 5) contains a multivariate empirical analysis examining the factors that contribute to skill mismatch and the impact of skill mismatch on various types of individual labour-market outcomes.

As the 2005 EWCS is a rich data set containing information on a wide range of variables likely to be relevant to mismatch, our models contain controls for individual human capital, employer training, firm size, contract type and health among others. A full list of all variables used and their definitions is given in Annex 1. Due to the many possible covariates within the data set, it was

necessary to undertake a process of data reduction using factor analysis, based on the idea that few common factors underly different groups of variables. Full details of this procedure, with groups of variables and the results of the factor analysis are given in Annex 2.

Using the EWCS for 31 countries, separate equations are run for the determinants of different forms of mismatch, earning levels and job satisfaction, in addition to the propensity to believe that working beyond the age of 60 is unlikely, that a job offers good career prospects and that employment will be terminated. In all instances, a multivariate equation is at first estimated for all age groups combined, but with dummy variables included for younger workers aged 15-29 and ageing workers aged 50 and over, and then for each of the age groups separately. A list of all multivariate techniques used, and a brief description, is given in Box 1.

To provide estimates for the EU using the EWCS it is necessary to weight data and therefore reflect the differences of size among the Member States. In our descriptive statistics we do adopt the weights provided with the data sets, while the multivariate results presented later incorporate country effects by including country dummies.

Box 1. **Multivariate statistical techniques used in this paper**

Interval regression

A multivariate estimation technique where a dependent variable, whose precise value is unknown, is regressed upon a series of explanatory factors. While the exact value of the dependent variable is unknown, it will lie within a known range (or interval).

Probit

A multivariate estimation technique where a dichotomous dependent variable is regressed upon a series of explanatory factors.

Multinomial probit

A multivariate estimation technique where a dependent variable that can take on a range of values is regressed upon a series of explanatory factors. While the dependent variable defines several distinct categories, there is no relationship between these categories and the value taken by the dependent variable.

Ordered probit

A multivariate estimation technique where a dependent variable that can take on a range of values is regressed upon a series of explanatory factors. There is a strict order in the categories defined by the dependent variable, although the magnitude of the values assigned to the dependent variable are in themselves arbitrary.

Factor analysis

A range of techniques that finds a small number of common factors that linearly reconstruct a set of identified variables.

Cluster analysis

A range of techniques that seeks to uncover common groups (or clusters) within data.

4. Mismatch: difference between countries and changes over time

4.1. The broad picture: mismatch in Europe

Before turning to changes over time and to differences between age groups, it is useful to summarise the extent of mismatch in Europe based on the latest 2005 survey. Table 1 lists nine possible outcomes with the weighted sample proportions reported within each cell ([1]). The smallest group, comprising just 1.68% of the sample (and based upon 394 underlying observations), consists of those who are both undereducated and underskilled ([2]).

Table 1. **Schematic of correlation between skill and educational mismatch categories**

	Overskilled	Matched skill	Underskilled	Total
Overeducated	Both over (6 %)	Overeducated only (6.44 %)	Overeducated and underskilled (2.28 %)	3 060 (14.71 %)
Matched education	Overskilled only (24.60 %)	Both matched (38.45 %)	Underskilled only (9.46 %)	17 657 (72.51 %)
Undereducated	Overskilled and undereducated (4.15 %)	Undereducated only (6.94 %)	Both under (1.68 %)	3 239 (12.78 %)
Total	7 942 (34.75 %)	12 877 (51.83 %)	3 137 (13.43 %)	23 956 (100 %)

NB: percentages are calculated using cross-national weights (w5_ewcs); sample sizes refer to unweighted figures; column and row percentages may not sum exactly to 100 due to rounding.

Source: EWCS 2005.

This immediately gives rise to the question of why organisations would choose to employ such workers. One possibility is that these are older workers and that employing them reduces the requirement for supervision and hence monitoring costs, although this hypothesis cannot be tested with our data and would seem to apply more to those who are overskilled rather than underskilled. Another possibility is that this group consists of long-serving employees who are

([1]) Note that the proportions reported in Table 1 are generated from cases where there is information available for both skill and education mismatch and do not refer to the proportions within the raw 2005 EWCS.

([2]) Educational mismatch is defined as deviations – either above for overeducation, or below for undereducation – from the (country-specific) average level of education in a respondent's occupation. Occupation is defined with reference to ISCO level 1 and ISCED education levels.

in a cohort which received less education than is common today and whose skills have become obsolete over time and not replaced by more up-to-date skills. However, ageing workers are not overrepresented in this group. Alternatively, hiring such workers may represent a second best strategy implemented by employers facing labour shortages for relatively unskilled posts.

We also have two mixed categories – overskilled and undereducated (4.15 % of the sample) and overeducated and underskilled (2.28%). The key question here is whether the lack of one form of mismatch is compensated by a surplus of the other. In other words, are the two complements or substitutes? In Tables 3 and 4 these two categories of mismatch will be double-counted, appearing under under-educated only, overskilled only, overeducated only and underskilled only, so that each of the rows will add up to over 100 % of the sample. This problem does not arise in the regression analysis, as we run separate regressions for each of the mismatch groups. Finally, being overskilled is much more common than being underskilled, while the frequency of overeducation and undereducation is roughly the same. The incidence of matched education is higher than that of matched skills.

4.2. Differences between countries

A key finding is that across countries only around 40 % of workers are matched in all respects. In Table 2 we cross-tabulate various forms of mismatch across the 31 countries ([3]). Overskilling is clearly the predominant form of mismatch, having on its own (excluding those who are both overeducated and overskilled) an EU-15 weighted average of 28.75 %, with a range across countries of 18.50% in the Czech Republic to 39.84 % in Romania. Overeducation on its own averages 8.72 %, ranging from 1.28 % in Lithuania to 13.83 % in the Czech Republic. The proportion of respondents who are both overeducated and overskilled is 6 %, ranging from 1.13 % in Lithuania to 11.98 % in France. The disparity across the majority of countries between undereducation and underskilling is much less pronounced, with underskilling averaging 11.75 % and ranging from 5.12 % in Sweden to 27.52 % in Austria, while for undereducation the mean is 11.10 %, with a range from 2.65 % in Slovakia to 24.45 % in Spain. Few workers are both undereducated and underskilled in any of the countries. There is wide variation in the proportion of respondents matched across countries. The countries which stand out with the highest proportions of matched workers with figures of over 50 % are the Czech Republic, Bulgaria and Slovakia while at the other extreme

([3]) Rows of Table 2 (likewise those of comparable tables that follow) will not add up to 100% as there is an element of double-counting across non-mutually exclusive categories.

Table 2. **Education and skills mismatch percentages**

	Overeducated only	Overskilled only	Overeducated and overskilled	Undereducated only	Underskilled only	Undereducated and underskilled	Matched
Belgium	9.49	20.65	5.78	12.22	9.93	1.32	43.96
Denmark	5.17	28.67	5.12	12.88	10.89	2.63	39.19
Germany	9.73	23.95	2.61	5.91	19.13	2.23	42.94
Ireland	10.19	34.61	8.56	18.06	7.42	2.68	30.84
Greece	9.02	34.14	6.75	14.47	12.31	2.88	27.77
Spain	11.58	26.13	11.11	24.45	5.23	2.39	28.83
France	9.94	33.57	11.98	16.94	7.92	1.99	27.34
Italy	6.28	25.70	2.30	7.79	13.38	1.17	46.64
Luxembourg	7.28	31.69	6.96	22.72	10.13	2.56	29.44
Netherlands	11.16	24.29	9.48	13.44	7.98	2.44	37.48
Austria	7.60	21.33	2.36	5.29	27.52	2.97	37.57
Portugal	7.34	19.17	6.48	9.29	8.72	2.07	50.05
Finland	5.72	21.14	2.46	17.09	12.23	2.33	44.39
Sweden	4.64	36.43	5.71	18.46	5.12	0.90	36.23
UK	8.09	34.74	7.75	7.61	7.10	0.81	38.78
EU-15 average	**8.72**	**28.75**	**6.00**	**11.10**	**11.75**	**1.68**	**38.45**
Bulgaria	9.62	24.34	5.96	5.90	5.51	0.29	50.49
Croatia	5.88	38.02	5.44	7.56	11.56	1.34	35.70
Cyprus	6.06	35.15	6.93	11.17	7.52	0.12	37.15
Czech Republic	13.83	18.50	3.41	2.98	12.76	0.00	52.34
Estonia	6.35	28.62	3.12	12.22	17.96	1.85	36.21
Hungary	11.38	31.27	7.41	17.34	11.72	1.24	31.81
Latvia	3.27	28.74	2.54	14.23	12.01	1.73	42.89
Lithuania	1.28	22.35	1.13	7.20	18.95	2.20	49.91
Malta	5.40	28.49	3.18	9.49	13.14	1.02	43.18
Norway	5.88	24.65	4.17	17.95	12.25	2.95	38.99
Poland	6.03	26.19	2.96	6.18	14.28	0.95	48.08
Romania	5.33	39.84	4.39	8.08	13.48	0.67	33.60
Slovenia	5.08	31.44	2.87	3.32	11.23	0.73	48.29
Slovakia	2.44	34.10	1.47	2.65	9.53	0.28	51.20
Switzerland	10.89	27.36	3.81	10.63	15.18	3.71	35.63
Turkey	10.92	36.39	5.41	14.11	12.83	1.51	28.59

NB: all percentages are calculated using cross-national weighted data (w5_ewcs).
Source: EWCS 2005.

significantly less than 30 % are matched in Greece and France. Thus, skill mismatch is a common phenomenon, but one which varies substantially across countries. We do not have simple explanations for such differences.

One possible explanation, however, is that there are differences in the occupational and industrial distributions of employment across countries. Examining first the occupational distribution based on the ISCO classification (Table 3) and limiting the analysis to the one-digit level of disaggregation, we find there is not much variation across occupational groups. However, under-education and underskilling are somewhat more prevalent in high-skilled non-manual occupations, while overskilling is somewhat more prevalent in elementary occupations. A higher proportion of skilled manual workers tend to be matched. This reflects that apprenticeships are closely linked to the requirements of the job, as skilled manual workers tend to engage in apprenticeship training before their professional careers. Using a more detailed breakdown (Annex 3) when there are more than 100 observations per occupation, we note that overeducation on its own ranges from 2.72 % for physical, mathematical and engineering professionals to 34.27 % for legislators and senior officials. The variation for overskilling is somewhat narrower overall, ranging from 8.06 % for legislators and senior officials to 36.19 % for other craft and related trades. The case of respondents claiming to be both overeducated and overskilled ranges from 1.04 % for skilled agricultural and fishery workers to 20.24 % for corporate managers. The proportion of the undereducated only ranges from 3.29 % for metal, machinery and related trades to 18.40 % for agricultural, fishery and related labourers. The proportion of the underskilled only ranges from 3.34 % for skilled agricultural and fishery workers to 21.70 % for physical, mathematical and engineering professionals. For those who are both undereducated and underskilled the range is from 0.06 % for drivers and mobile plant operators to 6.74 % for life science and health professionals.

Table 3. Occupational distribution percentages by mismatch category

	High-skilled non-manual (ISCO 1-3)	Low-skilled non-manual (ISCO 4-5)	Skilled manual (ISCO 6-8)	Elementary (ISCO 9)	Armed forces/ not stated	All occupations
Cases	8 390	6 539	5 281	3 450	296	23 956
Overeducated only	9.86	11.06	5.70	5.71	15.42	8.72
Overskilled only	26.90	27.64	30.13	33.53	29.47	28.75
Overeducated and overskilled	6.10	7.98	3.50	6.58	4.26	6.00
Undereducated only	14.02	10.51	7.43	11.54	10.75	11.10
Underskilled only	15.69	10.78	10.48	5.23	12.34	11.75
Undereducated and underskilled	3.22	1.26	0.69	0.40	0.57	1.68
Matched	32.99	37.06	46.49	41.29	32.88	38.45

NB: all percentages are calculated using cross-national weighted data (w5_ewcs).
Source: EWCS 2005.

Turning to the industrial composition of mismatch at one-digit level (Table 4) there is not much variation across sectors. However, overeducation is somewhat more prevalent in public administration and defence and overskilling in agriculture and fishing, which also has a higher proportion of undereducation and less underskilling than other sectors. The more detailed breakdown contained in Annex 4 reveals that the incidence of overeducation on its own (again adopting a 100 observation threshold) varies from 0.53 % for manufacture of wood products, etc., to 20.67 % for research and development. The proportion of those who are only overskilled ranges from 15.84 % for manufacture of electrical machinery and apparatus to 44.34 % for manufacture of rubber and plastic products. The incidence of overeducation and overskilling combined ranges from 0.73 % for sewage and refuse disposal, sanitation and similar to 16.21 % for research and development. Turning to undereducation only, the range is from 1.43 % for manufacture of basic metals to 33.59 % for activities of households as employers of domestic staff. For underskilling only, the figures range from 0.86 % for activities of households as employers of domestic staff to 21.27 % for manufacture of electrical machinery and apparatus. Finally, for those who are both undereducated and underskilled the range is from zero (in a number of industrial categories) to 6.11 % in supporting and auxiliary transport activities.

Table 4. Industrial distribution percentages by mismatch category

	Agriculture and fishing (NACE a-to-b)	Industry (NACE c-to-f)	Services (NACE g-to-k)	Public admin and defence (NACE l)	Other services (NACE m-to-q)	Not stated	All industries
Cases	548	6 190	7 937	1 887	7 147	247	23 956
Overeducated only	5.63	6.69	8.65	16.37	8.99	10.85	8.72
Overskilled only	32.47	29.87	30.32	22.70	26.36	34.74	28.75
Overeducated and overskilled	6.58	4.51	6.93	9.09	5.62	3.10	6.00
Undereducated only	13.16	9.46	11.53	10.65	12.07	17.02	11.10
Underskilled only	7.10	11.82	9.47	14.99	14.58	7.35	11.75
Undereducated and underskilled	1.83	1.46	1.34	1.08	2.73	0.06	1.68
Matched	37.36	41.82	37.90	34.56	36.47	37.89	38.45

NB: all percentages are calculated using cross-national weighted data (w5_ewcs).
Source: EWCS 2005.

We attempted to determine, through a shift/share approach which compared each EU-15 Member State against the overall average for the 15 countries combined, how much of the differences in mismatch of various types is a consequence of differences in occupational and industrial distributions across countries (structural differences) and how much results from the higher probability of mismatch within countries given these distributions. Usually structural differences in occupational and industrial distribution could explain little or none of the differences in mismatch across countries. However, there were some important exceptions. Occupational structure explained 56.3 % of the

proportion of overskilled in Austria, 39.5 % in Denmark, 23.7 % in Portugal, 21.7 % in France and 16.8 % in Greece. Industrial structure explained 46.6 % of the proportion of overskilled in Portugal and 37.0 % in the Netherlands. This leaves scope for institutional arrangements such as the way labour markets are organised and the degree of labour-market flexibility playing a role in explaning differences in mismatch across countries, but the nature of the data prevents us from investigating further.

After experimentation we found that data fell most naturally into two clusters (see Annex 5 for details). The first, consisting of 19 countries (Austria, Belgium, Bulgaria, the Czech Republic, Denmark, Estonia, Finland, Germany, Italy, Lithuania, Latvia, Malta, the Netherlands, Norway, Poland, Portugal, Slovenia, Slovakia, and Switzerland), was a relatively highly matched group, with 44.24 % of respondents matched for both education and skills. The second, with only 32.06 % of respondents well matched, consisted of 12 countries (Croatia, Cyprus, France, Greece, Hungary, Ireland, Luxembourg, Romania, Spain, Sweden, Turkey and the UK). This split emphasises that mismatch is a widespread phenomenon and differences across countries are a matter of degree.

Finally, given the potential of training to influence skill mismatch, it is necessary to say something about training questions. In the 2005 EWCS respondents were asked whether they had undergone any of five types of training to improve their skills over the past 12 months. The incidence varied from 30.9 % of respondents for training paid for or provided by the employer, averaging 7.4 days, 6.3 % for training paid for by the individual, averaging 26.4 days, 32.9 % for on-the-job training, 21.3 % for other forms of onsite training and learning and 4.9 % for other training. If training is paid for by the individual this is indicative of searching for another job, probably with another employer. The incidence of training should be lower for ageing workers as the payback period to recoup investment is shorter. In fact, this is only marginally the case for each of the five types of training, though the difference is somewhat greater in terms of training days. This implies perhaps that the need for training may be greater for ageing workers because of the impact of skill obsolescence.

4.3. Changes over time

Here we address the issue of whether there are trends in the degree of skill mismatch over time. We can use three EWCSs (1995, 2000, 2005) which contain relevant questions. This analysis is limited to the 15 countries present in these surveys, while the change in the overskilling question in 2005 means that the figures for this year are not comparable with those for 1995 and 2000. The

average rate of overskilling (weighted to be representative of EU-15 Member States) for all age groups was 10.03 % in 1995 and 7.82 % in 2000 (Table 5).

Table 5. **Descriptives (percentages) by survey year: all age groups**

	1995	2000	2005	1995	2000	2005
	(a) Overskilling			(b) Underskilling		
Belgium	4.42	4.72	26.51	8.00	7.70	11.33
Denmark	8.60	5.85	33.78	5.35	2.96	13.51
Germany	6.73	6.93	26.51	5.52	5.88	21.29
Ireland	5.68	8.65	43.16	5.97	9.02	10.10
Greece	11.04	5.18	40.90	11.20	10.15	14.98
Spain	18.81	8.66	37.23	3.52	8.01	7.61
France	8.59	4.47	45.33	7.06	10.98	9.83
Italy	11.88	11.87	27.86	7.00	7.94	14.47
Luxembourg	5.36	7.50	38.67	16.77	13.81	13.16
Netherlands	10.43	11.54	33.77	3.92	4.15	10.42
Austria	11.80	9.14	23.59	11.21	6.87	30.62
Portugal	8.66	5.95	25.65	11.51	4.98	10.79
Finland	5.75	6.08	23.68	5.08	2.77	14.54
Sweden	10.09	8.25	42.12	6.16	6.97	6.01
UK	12.19	8.73	42.64	11.80	11.62	7.85
EU-15 average	10.03	7.82	34.75	7.36	8.12	13.14
	(c) Satisfaction			(d) Cannot work at 60		
Belgium	42.41	34.04	32.27	*na*	38.27	38.15
Denmark	49.59	54.32	47.48	*na*	31.25	26.42
Germany	34.05	24.69	24.81	*na*	27.29	17.50
Ireland	54.88	49.29	29.29	*na*	31.92	20.73
Greece	13.67	14.88	21.55	*na*	45.36	44.56
Spain	23.79	14.98	14.62	*na*	35.10	35.83
France	20.43	21.58	22.98	*na*	40.67	47.15
Italy	20.87	16.98	13.49	*na*	26.65	25.43
Luxembourg	34.84	25.51	24.08	*na*	35.42	40.31
Netherlands	43.38	49.27	22.48	*na*	31.66	25.01
Austria	40.94	39.21	36.97	*na*	28.39	25.62
Portugal	20.28	12.26	18.93	*na*	44.37	44.17
Finland	30.70	26.43	20.17	*na*	37.00	29.75
Sweden	34.78	28.74	26.25	*na*	35.91	23.60
UK	36.51	39.93	44.32	*na*	27.02	16.67
EU-15 average	30.93	27.51	26.06	*na*	31.84	27.73

NB: all country figures refer to post-stratification weighted data (w4); EU-15 average calculated using cross-national weighted data (w5_ewcs); *na* denotes that data are not available in the survey year.

Source: EWCS.

In 1995, the degree of overskilling was lowest in Belgium at 4.42 % and highest in Spain at 18.81 %. In 2000, overskilling was lowest in France at 4.47 % and highest in Italy at 11.87 %. In 2005, though with a different definition, the lowest figure was recorded in Austria and the highest in France. Thus, the relative position of different countries changes over time and the figures for individual countries are sometimes unstable. For example, the figure for Spain declined from 18.81 % in 1995 to 8.66 % in 2000.

Again for all age groups the weighted average rate of underskilling was 7.36 % in 1995, 8.12 % in 2000 and 13.14 % in 2005. The volatility observed

above is repeated with Spain having the least underskilling in 1995 and Luxembourg the most, while in 2000 Finland had the lowest and Luxembourg the highest recorded levels of underskilling (though in the latter case reduced from 1995). In 2005, Sweden recorded the lowest figure and Austria the highest.

Job satisfaction, measured as the percentage reporting themselves as very satisfied with their current job shows a downward trend, averaging 30.93 % in 1995 and 26.06 % in 2005. Countries with relatively low levels of job satisfaction include Greece, Italy and Portugal, while those with high levels of job satisfaction include Denmark, Ireland and the UK. Therefore, there appears to be a split between northern and southern Europe in the extent to which individuals are happy at work, though again the figures can change markedly from one survey to another.

The question on whether respondents felt they would be unable to do the same job when they would be 60 years old was not asked in 1995, but elicited a higher level of agreement in 2000 (31.84 %) than in 2005 (27.73 %), with those in Germany and the UK being the most optimistic that they would be able to perform their job ([4]). Those in Greece and Portugal in particular were the least optimistic about their ability to work beyond the age of 60.

In Tables 6 to 8 the sample is split according to age group. Ageing workers are less susceptible to overskilling than the younger age groups (Table 8: 6.77 % in 1995, 5.97 % in 2000 and 32.80 % on the different basis in 2005). Again there is a wide variation in incidence across countries, with particularly low levels being recorded in Luxembourg and Finland and high levels in Greece and France. Except for 2005, the aggregate incidence of overskilling is lower than that of underskilling among ageing workers. This is to be expected if technological change makes the skills of ageing workers obsolete, thereby reducing the likelihood of overskilling and increasing the likelihood of underskilling as ageing workers will lack the new skills unless retrained.

The figures for underskilling among ageing workers are 8.51 % in 1995, 7.82 % in 2000 and 9.99 % in 2005, with Austria in particular consistently exhibiting a high incidence. Though the job satisfaction of ageing workers was higher than that of younger workers in 1995 (at 33.36 %), it has declined subsequently to 30.37 % in 2000 and 28.15 % in 2005. In contrast, the proportion of ageing workers below the age of 60 who believe that they would not be able to continue in their current job at age 60 remained largely stable at around 20 %, although this figure is well below that recorded for the younger age groups.

([4]) These descriptive statistics do not incorporate the impact of age. In the multivariate analysis, the impact of age is considered.

Table 6. **Descriptives (percentages) by survey year: ages 15-29**

	1995	2000	2005	1995	2000	2005
	(a) Overskilling			(b) Underskilling		
Belgium	5.06	7.05	31.72	8.94	6.71	13.97
Denmark	10.77	9.71	39.95	5.50	1.92	16.40
Germany	8.97	6.88	29.97	7.12	5.88	22.72
Ireland	7.11	15.43	46.48	8.11	7.50	13.47
Greece	12.81	5.19	34.28	11.06	9.44	22.60
Spain	28.36	11.87	48.73	4.80	8.53	5.81
France	11.68	7.04	38.53	6.44	11.74	9.98
Italy	9.16	17.22	20.37	5.79	4.21	22.29
Luxembourg	8.43	7.01	51.66	16.52	11.50	13.41
Netherlands	16.95	16.63	46.54	2.82	3.68	8.49
Austria	15.65	15.20	21.03	6.68	6.62	35.70
Portugal	12.58	8.53	32.00	15.28	7.12	13.23
Finland	10.28	11.59	25.85	4.85	2.81	15.65
Sweden	15.80	15.88	49.46	4.53	8.08	4.87
UK	15.10	12.36	37.98	12.80	8.80	14.81
EU-15 average	13.32	10.88	36.00	7.92	7.37	15.42
	(c) Satisfaction			(d) Cannot work at 60		
Belgium	42.95	38.82	31.17	*na*	40.68	38.41
Denmark	47.17	42.95	45.68	*na*	44.65	33.98
Germany	34.79	22.33	28.75	*na*	33.60	23.21
Ireland	50.85	46.09	25.62	*na*	36.89	25.62
Greece	11.17	14.56	20.18	*na*	50.92	39.65
Spain	15.24	14.50	12.25	*na*	43.99	39.39
France	18.81	20.41	21.60	*na*	48.39	46.11
Italy	17.87	15.84	12.40	*na*	32.07	30.05
Luxembourg	37.53	26.12	17.94	*na*	45.46	57.07
Netherlands	43.15	49.27	23.09	*na*	45.03	33.99
Austria	42.95	38.94	37.17	*na*	36.56	29.93
Portugal	20.42	14.77	18.54	*na*	42.45	42.46
Finland	26.67	28.28	15.96	*na*	54.74	40.27
Sweden	36.57	26.30	22.55	*na*	51.52	32.22
UK	35.84	39.57	48.18	*na*	35.33	19.94
EU-15 average	30.19	26.86	27.02	*na*	39.82	31.40

NB: all country figures refer to post-stratification weighted data (w4); EU-15 average calculated using cross-national weighted data (w5_ewcs); *na* denotes that data are not available in the survey year.

Source: EWCS.

Table 7. **Descriptives (percentages) by survey year: ages 30-49**

	1995	2000	2005	1995	2000	2005
	(a) Overskilling			(b) Underskilling		
Belgium	4.63	4.12	25.77	7.52	7.99	9.46
Denmark	8.48	5.01	33.33	4.81	3.80	14.30
Germany	6.70	7.28	24.13	3.89	5.74	23.78
Ireland	5.48	5.01	38.16	5.10	10.12	9.73
Greece	8.11	5.38	43.98	10.76	11.36	10.48
Spain	17.56	7.67	34.42	3.21	9.31	9.10
France	7.57	3.80	45.69	7.43	10.82	8.76
Italy	14.04	11.48	31.34	7.04	9.94	13.30
Luxembourg	4.86	9.25	33.86	17.30	13.01	14.25
Netherlands	8.16	9.11	29.83	3.83	4.31	12.53
Austria	11.42	7.53	25.18	11.29	6.79	28.65
Portugal	7.52	5.44	25.36	10.08	3.75	10.12
Finland	5.18	4.66	26.27	4.94	2.32	16.00
Sweden	10.42	7.54	41.63	7.74	5.91	7.66
UK	11.57	6.88	48.16	10.70	12.65	6.43
EU-15 average	9.63	7.07	34.88	6.71	8.57	13.44
	(c) Satisfaction			(d) Cannot work at 60		
Belgium	42.09	31.42	31.94	*na*	39.19	39.61
Denmark	48.85	56.03	44.10	*na*	32.46	31.60
Germany	32.02	24.85	23.49	*na*	28.37	14.92
Ireland	54.85	50.14	28.63	*na*	31.20	21.80
Greece	16.07	16.74	20.84	*na*	42.65	51.52
Spain	24.57	15.36	14.95	*na*	34.91	37.49
France	22.90	21.05	23.01	*na*	40.04	52.28
Italy	20.40	17.13	13.51	*na*	26.92	26.34
Luxembourg	33.74	25.13	26.32	*na*	31.26	37.55
Netherlands	43.61	49.88	21.20	*na*	29.01	25.91
Austria	40.65	40.09	34.96	*na*	26.11	25.47
Portugal	20.78	11.14	15.76	*na*	48.88	44.43
Finland	32.45	26.18	21.14	*na*	34.62	32.70
Sweden	34.37	27.40	26.65	*na*	37.32	26.26
UK	35.93	38.00	43.62	*na*	27.00	16.67
EU-15 average	30.43	26.77	24.92	*na*	31.87	28.86

NB: all country figures refer to post-stratification weighted data (w4); EU-15 average calculated using cross-national weighted data (w5_ewcs); *na* denotes that data are not available in the survey year.

Source: EWCS.

Table 8. **Descriptives (percentages) by survey year: ages 50+**

	1995	2000	2005	1995	2000	2005
	(a) Overskilling			(b) Underskilling		
Belgium	1.73	3.33	22.98	8.55	8.15	14.89
Denmark	6.09	3.13	29.36	6.52	2.41	9.69
Germany	4.42	6.01	28.78	7.76	6.29	14.81
Ireland	2.85	2.55	48.78	3.82	9.56	4.11
Greece	17.00	4.29	39.67	12.71	6.69	19.70
Spain	6.62	5.95	26.59	2.36	3.16	6.06
France	7.94	3.21	50.76	6.48	10.50	12.12
Italy	8.51	6.25	24.02	8.17	5.62	8.61
Luxembourg	1.44	1.44	40.68	14.82	20.52	8.73
Netherlands	5.75	10.19	26.57	6.42	4.44	7.92
Austria	5.88	4.16	24.17	19.50	7.60	26.75
Portugal	6.41	3.75	19.00	10.22	4.97	9.51
Finland	2.80	3.66	16.99	5.77	3.88	10.85
Sweden	4.96	4.10	38.44	4.50	8.02	4.20
UK	9.46	8.49	35.73	13.07	12.65	3.29
EU-15 average	6.77	5.97	32.80	8.51	7.82	9.99
	(c) Satisfaction			(d) Cannot work at 60		
Belgium	42.92	36.30	34.80	*na*	30.73	31.90
Denmark	54.66	63.90	54.97	*na*	10.87	7.32
Germany	38.11	26.79	24.49	*na*	15.77	18.56
Ireland	64.79	54.59	38.55	*na*	20.66	5.65
Greece	10.33	7.70	25.94	*na*	42.85	25.67
Spain	35.44	14.70	17.70	*na*	16.47	20.72
France	12.47	24.70	25.02	*na*	32.76	35.53
Italy	25.49	17.98	14.92	*na*	18.89	12.68
Luxembourg	34.27	26.04	23.11	*na*	37.03	31.57
Netherlands	42.99	47.55	24.73	*na*	16.18	8.78
Austria	38.08	36.36	42.97	*na*	22.69	18.61
Portugal	18.74	11.48	26.61	*na*	35.49	45.83
Finland	29.53	25.02	21.36	*na*	21.53	13.87
Sweden	34.11	32.84	27.93	*na*	19.52	11.31
UK	38.89	44.54	42.73	*na*	16.38	12.50
EU-15 average	33.36	30.37	28.15	*na*	20.58	20.08

NB: all country figures refer to post-stratification weighted data (w4); EU-15 average calculated using cross-national weighted data (w5_ewcs); *na* denotes that data are not available in the survey year.

Source: EWCS.

5. Determinants and impact of mismatch

In this chapter, we first present models that relate different types of skill mismatch to factors potentially impacting on it. The probit model is used as a framework for this multivariate analysis of the incidence of mismatch and skill obsolescence (Tables 9 to 12). Then we look at the impacts of different types of mismatch (and other explanatory variables) on the determinants of job satisfaction (Table 14); career prospects (Table 15); and the fear of job loss (Table 16). Multinomial probits and ordered probits are used to model individual health status (Table 17), although the results presented refer only to those derived from an ordered probit equation. Interval regression is used in the wage equation analysis, for which the results are shown in Table 13.

The analyses in this chapter are carried out for all workers together, in which age is an explanatory variable, and for each of our three age groups separately. This enables focus on ageing workers while at the same time, comparisons between ageing workers and their younger colleagues can be made.

5.1. Determinants of mismatch

5.1.1. Overskilling

Table 9 (column 1) examines the factors related to overskilling. As found in earlier studies, overskilling is positively related to overeducation and negatively related to undereducation. Ageing workers are significantly less likely to be overskilled than prime age workers, while the reverse is true for younger workers. Younger workers lack experience and some may be in entry level jobs somewhat basic in their skill demands. Although overskilling rises with experience, it falls with length of tenure, suggesting a tendency for employers to find a better match for their workers over time. Level of education also matters. Those with the lowest qualifications are significantly less likely to be overskilled than the omitted category (those with post-secondary education). Receipt of on-the-job training is associated with a lower probability of overskilling, suggesting perhaps that the skills previously held were not wholly relevant to the job. One example would be workers trained for managerial posts and required to be trained in human resource management before being promoted. In contrast, the length of training paid for by the worker is positively associated with overskilling. This is consistent with overskilled workers training for another job, most likely with another employer, where their skills may be fully used.

Table 9. **Determinants of mismatch (probit analysis): all age groups**

	(1) Overskilled	(2) Underskilled	(3) Overeducated	(4) Undereducated	(5) Obsolescence
male	0.027	0.033	0.029	-0.020	-0.073++
exper	0.010+++	-0.016+++	-0.037+++	0.021+++	-0.008
exper2	0.000++	0.000	0.000+++	0.000	0.000
age1529	0.061+	-0.026	-0.242+++	0.121++	-0.078
age50p	-0.061++	0.003	0.256+++	0.018	-0.376+++
tenure	-0.013+++	-0.009+	-0.006	0.004	0.000
tenure2	0.000++	0.000+	0.000	0.000	0.000
noqual	-0.302++	-0.493++			0.433
primary	-0.224+++	-0.213++			0.096
lowsec	-0.089++	-0.175+++			-0.064
upsec	-0.005	-0.115+++			0.001
degree	0.046	-0.014			-0.051+
postgrad	0.101	-0.207++			-0.202
emptrain	0.000	0.007+++	0.004++	-0.001	0.002
emptrain2	0.000	0.000+++	0.000++	0.000	0.000
owntrain	0.005+++	0.002	0.002	-0.003	0.001
owntrain2	0.000+++	0.000	0.000	0.000	0.000
onjobtrain	-0.114+++	0.277+++	0.020	-0.018	0.067+
otheronsite	0.003	0.155+++	0.141+++	-0.110+++	-0.057
othertrain	0.034	0.154+++	0.109++	0.002	-0.107
perm	0.022	-0.066++	-0.020	-0.119+++	0.091+
hours	-0.002+	0.001	0.002	0.001	0.006+++
parttime	0.000	0.016	0.055	0.074+	-0.026
supervise	0.000	0.000	0.001++	0.000	0.000
size1049	-0.016	-0.024	0.001	-0.048	0.116++
size5099	0.039	-0.035	-0.075+	-0.125+++	0.061
size100249	0.003	-0.071	0.036	-0.104++	0.201+++
size250499	0.020	-0.093	-0.024	-0.200+++	0.000
size500	0.040	-0.014	0.083+	-0.104++	0.012
public	-0.044+	0.121+++	0.150+++	-0.052+	-0.039
fearjobloss	0.071+++	0.124+++	-0.012	0.034	0.149+++
fewerhours	0.026	0.075	0.303+++	-0.269++	0.188
health2	0.025	0.106+++	0.020	-0.083+++	0.254+++
health3	0.094+++	0.089++	0.044	-0.056	0.307+++
sickleave	0.000	0.000	-0.002	0.001	0.002
sickleave2	0.000	0.000	0.000	0.000	0.000
grp1_factor1	-0.005	-0.010	0.031++	-0.018	0.052
grp2_factor1	0.056+++	-0.027++	-0.019	0.035+++	0.096+++
grp2_factor2	0.031+++	-0.085+++	-0.158+++	0.082+++	-0.086+++
grp3_factor1	0.014	0.140+++	0.142+++	-0.102+++	-0.029+++
grp3_factor2	0.023++	0.002	-0.041+++	0.004	-0.003
grp4_factor1	0.006	0.007	0.022+	0.009	0.013
grp4_factor2	0.004	0.051+++	0.010	0.034++	0.013
grp5_factor1	-0.004	0.024+	-0.054+++	0.031++	0.044
grp5_factor2	-0.008	0.030++	-0.024+	0.018	-0.154+++
grp6_factor1	-0.094+++	-0.003	-0.034++	0.002	-0.082+++
grp6_factor2	-0.040+++	0.017	0.012	-0.007	-0.023
grp6_factor3	0.046+++	-0.049+++	0.047+++	0.027++	-0.089+++
grp6_factor4	-0.012	0.075+++	0.035+++	-0.027++	0.023
Austria	-0.078	0.219+++	-0.185+	-0.122	0.329++
Belgium	0.064	-0.401+++	-0.007	0.540+++	0.667+++
Bulgaria	0.257+++	-0.731+++	0.067	-0.127	0.874+++
Croatia	0.604+++	-0.384+++	-0.297+++	0.051	0.694+++
Cyprus	0.505+++	-0.601+++	-0.084	0.257++	0.647+++
Czech Republic	-0.068	-0.361+++	0.023	-0.693+++	0.581+++
Denmark	0.221+++	-0.491+++	-0.399+++	0.639+++	0.408+++
Estonia	0.206+++	-0.241++	-0.252++	0.290+++	0.250

	(1) Overskilled	(2) Underskilled	(3) Overeducated	(4) Undereducated	(5) Obsolescence
Finland	-0.091	-0.503+++	-0.462+++	0.609+++	0.256
France	0.581+++	-0.454+++	0.223+++	0.547+++	0.812+++
Greece	0.411+++	-0.305+++	0.069	0.572+++	0.930+++
Hungary	0.375+++	-0.224+++	0.238+++	0.535+++	0.806+++
Ireland	0.415+++	-0.510+++	0.068	0.650+++	0.322++
Italy	0.136+	-0.133	-0.291+++	0.155	0.407+++
Lithuania	-0.111	-0.069	-0.710+++	0.098	0.304++
Luxembourg	0.386+++	-0.369+++	-0.067	0.836+++	0.783+++
Latvia	0.202+++	-0.430+++	-0.565+++	0.317+++	0.134
Malta	0.229+++	-0.537+++	-0.298+++	0.152	0.539+++
Netherlands	0.171++	-0.599+++	0.092	0.507+++	0.315++
Norway	0.083	-0.398+++	-0.380+++	0.664+++	0.285++
Poland	0.161++	-0.346+++	-0.233++	0.018	0.805+++
Portugal	0.062	-0.335+++	0.145+	0.153	0.738+++
Romania	0.539+++	-0.185++	-0.366+++	0.219++	0.637+++
Slovakia	0.309+++	-0.435+++	-0.720+++	-0.146	0.602+++
Slovenia	0.309+++	-0.493+++	-0.393+++	-0.358+++	0.840+++
Spain	0.289+++	-0.582+++	0.535+++	0.772+++	0.202
Sweden	0.534+++	-0.951+++	-0.415+++	0.745+++	0.215
Switzerland	0.190+++	-0.169++	-0.124	0.504+++	0.193
Turkey	0.414+++	-0.270+++	0.092	0.417+++	0.947+++
UK	0.496+++	-0.739+++	-0.156+	0.106	0.023
nojobat60	-0.049	-0.002	-0.006	0.020	
underskill			0.029	0.074+	-0.040
overskill			0.174+++	-0.124+++	-0.047
undered	-0.035	0.186+++			-0.005
overed	0.121+++	-0.072			0.030
constant	-0.666+++	-0.751+++	-0.851+++	-1.751+++	-1.828+++
Observations	20 018	20 018	20 018	20 018	9 623

NB: dependent variable is overskill, underskill, overed, undered, nojobat60 for columns (1) to (5) respectively;
+, ++, +++ denotes statistical significance at the 90 %, 95 %, 99 % confidence levels respectively.
Variable names are in Annex 1.

Source: EWCS 2005.

Overskilled workers are more likely to suffer from health problems than their matched colleagues and, as a result perhaps reflecting stress, to have taken time off work in the past year. The groupings determined by factor analysis suggest a positive relationship between overskilling and various shiftworking arrangements and with demanding work of various kinds, some of which may be linked to health problems, as discussed below. After regression analysis has controlled for all the observed differences between countries (represented by all the variables in Table 9), there still remain significant variations in the extent of overskilling across countries, estimated by the country-specific dummy variables. These dummies represent all country-specific overskilling differences that have not been explained by the differences in all other variables included in the regression. We see that most countries appear to have significantly higher levels of overskilling than the omitted/reference country (which we chose to be Germany as the largest economy). In fact, in no country is the likelihood of overskilling, *ceteris paribus*, significantly lower than in Germany, probably reflecting the way in which labour markets are organised in Germany.

The factor analysis does not allow us to identify which components of each factor group were responsible for any significant relationship, so additional separate regressions were run with each of the components entered separately (although these results are not shown). These revealed that overskilling was positively related to job speed, physically demanding work, job self-assessment, job problem-solving and job monotony, but it was negatively related to learning new things on the job and self-management. This is an important finding as employers have a means of reducing the degree of overskilling (or the perception of being overskilled) by offering their employees greater challenges.

When the sample is split by age group (Tables 10, 11 and 12), tenure appears to be no longer an issue for ageing workers. Further, ageing workers with degrees are significantly more likely to be overskilled than those with lower qualifications. Ageing overskilled workers also have a preference for shorter hours, unlike the younger overskilled worker groups, which could be symptomatic of an underlying dissatisfaction with being overskilled or a pure age effect.

Table 10. **Determinants of mismatch (probit analysis): ages 15-29**

	(1) Overskilled	(2) Underskilled	(3) Overeducated	(4) Undereducated	(5) Obsolescence
male	-0.014	0.068	-0.102+	0.155++	-0.049
exper	0.019++	-0.044+++	-0.092+++	0.044+++	0.015
exper2	0.000+	0.000+++	0.001++	0.000+++	0.000
tenure	-0.011	-0.049++	-0.004+	0.050	-0.024
tenure2	0.000	0.005++	0.001	-0.002	0.003
noqual	0.364	(omitted)			1.600++
primary	-0.061	0.217			0.434
lowsec	-0.060	0.018			-0.152
upsec	0.196++	-0.076			0.210
degree	0.211++	-0.080			0.058
postgrad	0.397++	-0.068			-0.025
emptrain	-0.003	0.007++	0.006	-0.004	0.001
emptrain2	0.000	0.000+	0.000+	0.000	0.000
owntrain	0.006++	-0.001	0.000	0.000	0.002
owntrain2	0.000	0.000	0.000	0.000	0.000
onjobtrain	-0.157+++	0.320+++	0.093	-0.083	0.183+
otheronsite	0.067	0.103	0.052	-0.091	0.020
othertrain	0.044	0.177	-0.179	0.079	-0.173
perm	0.048	-0.170+++	0.104	-0.183+++	0.097
hours	-0.005+	0.002	0.002	-0.003	0.004
parttime	0.079	-0.062	0.023	0.054	0.203
supervise	0.001	0.004	0.008+	0.002	-0.006
size1049	-0.014	-0.059	0.006	-0.132+	0.186+
size5099	-0.107	0.069	0.011	-0.120	0.207
size100249	0.001	-0.090	0.097	-0.172	0.135
size250499	0.126	-0.141	-0.050	-0.441++	0.372++
size500	-0.026	-0.006	0.303+++	-0.261+	-0.027
public	-0.040	0.120+	0.208+++	0.043	-0.043
fearjobloss	0.057	0.161++	0.051	0.063	0.042
fewerhours	0.695++	0.394	-0.075	-0.006	0.475
health2	0.099+	0.104	0.030	-0.112	0.196+
health3	0.151++	-0.110	0.039	-0.016	0.132
sickleave	0.005	0.009++	-0.001	0.002	-0.004
sickleave2	0.000	0.000	0.000	0.000	0.000

	(1) Overskilled	(2) Underskilled	(3) Overeducated	(4) Undereducated	(5) Obsolescence
grp1_factor1	0.060+++	-0.078+++	0.019	-0.004	0.103++
grp2_factor1	0.036+	-0.036	0.037	0.011	0.100++
grp2_factor2	-0.044	-0.081+++	-0.157+++	0.071+	-0.117+
grp3_factor1	-0.001	0.096+++	0.087+++	-0.152+++	0.064
grp3_factor2	0.042+	-0.027	-0.013	0.047	0.013
grp4_factor1	-0.021	0.054++	0.044	0.044	-0.031
grp4_factor2	0.003	0.083+++	0.042	0.019	-0.041
grp5_factor1	0.017	0.027	-0.058+	0.007	-0.167++
grp5_factor2	-0.028	0.060++	-0.017	0.017	-0.200+++
grp6_factor1	-0.138+++	0.008	-0.067++	0.077++	-0.064
grp6_factor2	-0.022	-0.007	-0.053+	0.042	-0.024
grp6_factor3	0.012	-0.046	0.115+++	0.034	-0.107++
grp6_factor4	-0.036	0.041	0.001	0.045++	0.004
Austria	-0.163	0.321+	-0.304	-0.601+	0.046
Belgium	0.069	-0.409++	0.349+	0.454	0.687++
Bulgaria	0.099	-0.471++	0.014	-0.211	0.744++
Cyprus	0.437++	-0.337	-0.017	-0.245	0.853+++
Croatia	0.505+++	-0.408++	-0.037	-0.402+	0.448+
Czech Republic	-0.267	-0.340+	-0.072	-0.558+	0.657++
Denmark	0.245	-0.224	-0.387+	0.746+++	0.352
Estonia	0.240	-0.151	-0.088	0.621+++	0.602+
Finland	-0.251	-0.582+++	-0.408+	0.727+++	-0.567
France	0.290+	-0.661+++	0.235	0.236	0.893+++
Greece	0.076	0.016	0.420++	-0.148	0.748++
Hungary	0.304++	-0.217	0.430++	0.474+++	0.813+++
Ireland	0.413+++	-0.378++	0.519+++	0.075	0.254
Italy	-0.210	0.063	-0.103	-0.305	0.239
Latvia	-0.004	-0.238	-0.302	0.630+++	0.293
Lithuania	-0.129	0.221	-1.186+++	0.494++	0.348
Luxembourg	0.511+++	-0.193	0.126	0.329	1.227+++
Malta	0.032	-0.326+	0.396+	-0.789+++	0.858+++
Netherlands	0.123	-0.553++	0.728+++	0.069	0.853+++
Norway	-0.109	-0.356+	-0.013	0.284	-0.128
Portugal	0.129	-0.416++	0.698+++	-0.407+	0.538++
Romania	0.270+	0.064	0.012	-0.209	0.734+++
Slovakia	0.133	-0.396++	-0.491++	-0.365	0.253
Slovenia	0.312+	-0.451++	-0.297	(omitted)	0.506+
Spain	0.389+++	-0.680+++	0.681+++	0.516+++	0.236
Sweden	0.397++	-0.929+++	-0.523++	0.647+++	0.422
Switzerland	0.095	-0.182	0.041	0.586+++	-0.219
Turkey	0.499+++	-0.211	0.370+	0.078	0.657++
Poland	0.114	-0.519+++	0.122	-0.216	0.919+++
UK	0.251+	-0.476+++	-0.139	-0.236	-0.346
nojobat60	-0.034	-0.208++	-0.094	0.053	
underskill			0.023	0.226+++	-0.325+++
overskill			0.249+++	-0.086	-0.092
undered	-0.024	0.246++			0.000
overed	0.217+++	-0.049			0.067
constant	-0.634+++	-0.735+++	-1.223+++	-1.472+++	-2.103+++
Observations	3 940	3 926	3 940	3 853	1 635

NB: dependent variable is overskill, underskill, overed, undered, nojobat60 for columns (1) to (5) respectively;
+, ++, +++ denotes statistical significance at the 90 %, 95 %, 99 % confidence levels respectively.
Variable names are in Annex 1.

Source: EWCS 2005.

Table 11. **Determinants of mismatch (probit analysis): ages 30-49**

	(1) Overskilled	(2) Underskilled	(3) Overeducated	(4) Undereducated	(5) Obsolescence
male	0.037	0.063+	0.017	-0.022	-0.073
exper	0.006	-0.018+++	-0.039+++	0.022+++	-0.013
exper2	0.000	0.000+	0.000++	0.000	0.000
tenure	-0.011++	-0.006	-0.002	-0.015++	-0.019++
tenure2	0.000	0.000	0.000	0.001+++	0.001++
noqual	-0.275	-0.676++			0.369
primary	-0.211++	-0.236++			-0.042
lowsec	-0.056	-0.252+++			-0.143
upsec	-0.018	-0.170+++			-0.072
degree	-0.029	-0.004			-0.091
postgrad	-0.029	-0.261++			-0.209
emptrain	-0.001	0.005+++	0.006+++	-0.001	0.003
emptrain2	0.000	0.000	0.000++	0.000	0.000
owntrain	0.004+	0.001	0.005	-0.005	0.003
owntrain2	0.000+	0.000	0.000	0.000	0.000
onjobtrain	-0.103+++	0.221+++	0.021	0.017	0.051
otheronsite	-0.045	0.187+++	0.149+++	-0.051	-0.068
othertrain	0.037	0.142++	0.181+++	-0.110	-0.141
perm	0.039	-0.005	-0.013	-0.108++	0.106
hours	-0.002	0.000	0.002	0.001	0.008+++
parttime	-0.010	0.005	0.037	0.009	-0.016
supervise	0.000	0.000	0.002+++	0.000	0.000
size1049	-0.015	-0.010	-0.012	0.005	0.122++
size5099	0.054	-0.074	-0.117++	-0.086	0.066
size100249	0.013	-0.067	0.030	-0.057	0.270+++
size250499	0.025	-0.058	-0.103	-0.199++	-0.042
size500	0.105++	-0.031	0.023	-0.087	0.000
public	-0.072++	0.128+++	0.092++	-0.015	-0.045
fearjobloss	0.054	0.159+++	-0.069	0.088+	0.192+++
fewerhours	-0.032	-0.244	0.303+	-0.380+	0.428+
health2	0.021	0.108+++	0.027	-0.058	0.266+++
health3	0.080+	0.154+++	0.059	-0.071	0.359+++
sickleave	0.000	-0.001	0.000	0.000	0.002
sickleave2	0.000	0.000	0.000	0.000	0.000
grp1_factor1	-0.018	0.000	0.029	-0.034+	0.051++
grp2_factor1	0.050+++	-0.023	-0.038++	0.039++	0.106+++
grp2_factor2	0.037++	-0.081+++	-0.151+++	0.072+++	-0.066
grp3_factor1	0.022	0.150+++	0.150+++	-0.102+++	-0.033
grp3_factor2	0.002	0.006	-0.036++	-0.002	-0.014
grp4_factor1	0.001	-0.016	0.019	-0.009	0.037++
grp4_factor2	-0.010	0.053+++	0.016	0.027	0.018
grp5_factor1	-0.010	0.017	-0.034	0.022	0.064+
grp5_factor2	-0.007	0.035++	-0.019	0.024	-0.156+++
grp6_factor1	-0.081+++	-0.002	-0.018	-0.014	-0.099+++
grp6_factor2	-0.043+++	0.049++	0.025	0.012	-0.031
grp6_factor3	0.057+++	-0.038++	0.043++	0.033+	-0.104+++
grp6_factor4	-0.006	0.084+++	0.024	-0.018	0.014
Austria	-0.043	0.178+	-0.280++	-0.264+	0.486++
Belgium	0.130	-0.501+++	-0.144	0.422+++	0.759+++
Bulgaria	0.350+++	-0.832+++	-0.061	-0.155	0.957+++
Croatia	0.654+++	-0.419+++	-0.456+++	0.006	0.908+++
Cyprus	0.660+++	-0.692+++	-0.136	-0.009	0.788+++
Czech Republic	0.025	-0.463+++	-0.062	-0.830+++	0.653+++
Denmark	0.230++	-0.556+++	-0.422+++	0.537+++	0.551+++
Estonia	0.355+++	-0.238+	-0.400+++	0.061	0.414+
Finland	0.131	-0.580+++	-0.483+++	0.343+++	0.366+
France	0.636+++	-0.456+++	0.197+	0.405+++	0.891+++

	(1) Overskilled	(2) Underskilled	(3) Overeducated	(4) Undereducated	(5) Obsolescence
Greece	0.568+++	-0.512+++	-0.100	0.493+++	1.119+++
Hungary	0.426+++	-0.282++	0.058	0.436+++	0.827+++
Ireland	0.401+++	-0.496+++	-0.067	0.431+++	0.466++
Italy	0.292+++	-0.242+	-0.508+++	-0.130	0.565+++
Lithuania	-0.016	-0.112	-0.991+++	-0.139	0.434++
Luxembourg	0.396+++	-0.453+++	-0.219+	0.835+++	0.833+++
Latvia	0.422+++	-0.511+++	-0.822+++	0.077	0.178
Malta	0.405+++	-0.591+++	-0.757+++	-0.127	0.520++
Netherlands	0.284+++	-0.631+++	-0.075	0.436+++	0.425++
Norway	0.164	-0.450+++	-0.559+++	0.568+++	0.529+++
Poland	0.163	-0.279++	-0.410+++	-0.079	0.855+++
Portugal	0.097	-0.362+++	-0.099	0.002	0.890+++
Romania	0.595+++	-0.206+	-0.526+++	0.093	0.629+++
Sweden	0.671+++	-0.982+++	-0.539+++	0.597+++	0.371++
Slovenia	0.331+++	-0.489+++	-0.531+++	-0.549+++	0.886++
Slovakia	0.346+++	-0.428+++	-0.859+++	-0.129	0.676+++
Spain	0.319+++	-0.574+++	0.512+++	0.565+++	0.327
Switzerland	0.221++	-0.200+	-0.172	0.340+++	0.402++
UK	0.694+++	-0.812+++	-0.147	0.035	0.249
Turkey	0.416+++	-0.249+	-0.009	0.250	1.176+++
nojobat60	-0.067	0.042	0.059	0.031	
underskill			0.041	0.023	0.000
overskill			0.157+++	-0.108+++	-0.055
undered	-0.042	0.155++			0.058
overed	0.143+++	-0.079			0.063
constant	-0.703+++	-0.711+++	-0.719+++	-1.641+++	-1.901+++
Observations	10 923	10 923	10 923	10 923	5 332

NB: dependent variable is overskill, underskill, overed, undered, nojobat60 for columns (1) to (5) respectively;
+, ++, +++ denotes statistical significance at the 90 %, 95 %, 99 % confidence levels respectively.
Variable names are in Annex 1.

Source: EWCS 2005.

Table 12. **Determinants of mismatch (probit analysis): ages 50+**

	(1) Overskilled	(2) Underskilled	(3) Overeducated	(4) Undereducated	(5) Obsolescence
male	0.055	-0.085	0.171++	-0.167+++	-0.082
exper	-0.002	-0.008	0.002	-0.025++	0.062++
exper2	0.000	0.000	0.000+	0.001+++	-0.001+++
tenure	-0.016+++	-0.021++	-0.018+++	0.012+	0.025+
tenure2	0.000+	0.000++	0.000	0.000	-0.001
noqual	-0.414+	-0.235			0.419
primary	-0.282++	-0.520+++			0.221
lowsec	-0.109	-0.268++			0.267
upsec	-0.092	-0.009			0.114
degree	0.139+	-0.031			0.013
postgrad	0.252+	-0.232			-0.344
emptrain	-0.001	0.027+++	0.011+	-0.001	0.010
emptrain2	0.000	0.000+++	0.000++	0.000	0.000
owntrain	0.020+++	0.010+	-0.006	0.000	0.011
owntrain2	0.000+++	0.000	0.000	0.000	0.000
onjobtrain	-0.076	0.313+++	-0.068	-0.045	0.029
otheronsite	0.062	0.081	0.180+++	-0.237+++	-0.047
othertrain	-0.002	0.096	0.098	0.178	0.032
perm	-0.027	0.015	-0.133+	-0.101+	-0.085
hours	0.001	0.004	0.003	0.005+	0.002
parttime	-0.034	0.133	0.106	0.154++	-0.357++
supervise	0.001	-0.002	0.000	0.000	0.001++
size1049	-0.022	-0.030	-0.009	-0.095+	-0.057
size5099	0.071	0.004	-0.090	-0.154++	-0.124
size100249	-0.041	-0.090	-0.027	-0.130+	-0.014
size250499	-0.060	-0.140	0.088	-0.111	-0.136
size500	-0.078	0.061	0.042	-0.067	-0.090
public	-0.010	0.116++	0.223+++	-0.128++	-0.048
fearjobloss	0.116+w+	-0.011	0.043	-0.051	0.209+
fewerhours	0.041	0.266	0.369+	-0.313	(omitted)
health2	-0.034	0.145++	0.019	-0.102+	0.275+++
health3	0.071	0.114	0.041	-0.055	0.241+
sickleave	0.000	-0.002	-0.003	0.001	0.003
sickleave2	0.000	0.000	0.000	0.000	0.000
grp1_factor1	-0.033	0.026	0.019	0.016	0.020
grp2_factor1	0.083+++	-0.026	-0.041	0.052++	0.055
grp2_factor2	0.067+++	-0.117+++	-0.172+++	0.091+++	-0.137++
grp3_factor1	0.004	0.213+++	0.163+++	-0.073+++	-0.090+
grp3_factor2	0.045++	0.011	-0.066++	-0.009	0.026
grp4_factor1	0.038++	0.018	-0.005	0.025	-0.044
grp4_factor2	0.041+	-0.005	-0.051+	0.059++	0.042
grp5_factor1	0.000	0.038	-0.073+	0.046+	0.138++
grp5_factor2	0.010	-0.006	-0.029	0.007	-0.116+
grp6_factor1	-0.065+++	-0.025	-0.004	-0.028	-0.035
grp6_factor2	-0.049++	-0.041	0.019	-0.041+	0.014
grp6_factor3	0.051	-0.070++	0.021	-0.002	-0.043
grp6_factor4	-0.016	0.082+++	0.090+++	-0.089+++	0.080
Austria	-0.038	0.274	0.135	0.570++	0.122
Belgium	-0.035	-0.248	-0.077	1.030+++	0.624++
Bulgaria	0.173	-0.788+++	0.158	0.160	0.686+++
Croatia	0.621+++	-0.252	-0.246	0.615+++	0.428
Cyprus	0.224	-0.599++	-0.185	1.019+++	0.075
Czech Republic	-0.100	-0.164	0.210	-0.423	0.323
Denmark	0.146	-0.688+++	-0.577+++	1.085+++	-0.100
Estonia	-0.035	-0.370+	-0.123	0.569+++	-0.632
Finland	-0.443+++	-0.416++	-0.522+++	1.168+++	0.121
France	0.730+++	-0.305	0.158	1.135+++	0.795+++

	(1) Overskilled	(2) Underskilled	(3) Overeducated	(4) Undereducated	(5) Obsolescence
Greece	0.337+	0.020	0.060	1.393+++	0.524
Hungary	0.299++	-0.079	0.465+++	0.873+++	0.715+++
Ireland	0.475+++	-0.752+++	-0.155	1.520+++	0.043
Italy	0.149	-0.267	-0.110	0.954+++	0.098
Latvia	-0.060	-0.442++	-0.371+	0.637+++	-0.168
Lithuania	-0.255	-0.181	-0.293	0.541+++	0.045
Luxembourg	0.343+	-0.383	0.126	1.156+++	0.477
Malta	0.130	-0.656+++	-0.534++	1.102+++	0.033
Netherlands	0.021	-0.623+++	0.074	0.992+++	-0.144
Norway	0.033	-0.422++	-0.375++	1.241+++	-0.245
Poland	0.230	-0.546++	-0.449++	0.518++	0.532+
Portugal	-0.239	-0.048	-0.198	0.865+++	0.724
Romania	0.645+++	-0.408+	-0.489++	0.873+++	0.614+
Slovakia	0.336++	-0.524+++	-0.698+++	0.048	0.638++
Slovenia	0.332+	-0.750+++	-0.213	0.459+	1.099+++
Spain	0.046	-0.494++	0.514+++	1.412+++	-0.028
Sweden	0.345+++	-0.997+++	-0.346++	1.283+++	-0.289
Switzerland	0.190	-0.224	-0.212	0.950+++	-0.180
Turkey	0.198	-0.537	-0.011	1.276+++	1.243+++
UK	0.283+	-0.919+++	-0.180	0.475++	-0.221
nojobat60	-0.035	0.157	-0.157	-0.038	
underskill			-0.029	0.068	0.124
overskill			0.169+++	-0.173+++	0.006
undered	-0.036	0.263+++			-0.074
overed	0.012	-0.065			-0.135
constant	-0.487++	-0.938+++	-0.947+++	-1.763+++	-2.638+
Observations	5 124	5 124	5 124	5 124	2 604

NB: dependent variable is overskill, underskill, overed, undered, nojobat60 for columns (1) to (5) respectively;
+, ++, +++ denotes statistical significance at the 90 %, 95 %, 99 % confidence levels respectively.
Variable names are in Annex 1.

Source: EWCS 2005.

5.1.2. Underskilling

The associations between underskilling and the explanatory variables could be mirror images, with opposite signs, to those for overskilling. There is evidence in terms of over- and undereducation, with the former being negative and significant and the latter positive and significant in contrast to overskilling (Table 9, column 2). Yet, when we look at other variables this is not always true. Unlike overskilling, there is no significant difference in the likelihood of being underskilled across the three age groups in the combined equation. While tenure is signed oppositely to overskilling, experience is signed the same. The educational effects are stronger for underskilling, all the variables being negatively signed, suggesting that those with non-tertiary post-secondary education (the omitted category) are more prone to being underskilled. On-the-job training is positively signed and highly significant, which suggests that the relationship runs from underskilling to this form of training rather than the other way round and that if employers perceive the need to train underskilled workers this is apparently insufficient to remove the workers' perception of being underskilled. Other forms of training are also significant and positively signed. Those employed in the public sector are more likely to be underskilled, which is the reverse of the relationship found for the overskilled. Both overskilled and

underskilled are more likely to report health problems than their matched counterparts, though the type of problems might be different (such as mental versus physical). On the whole, the groupings derived from factor analysis do have opposite signs relative to the overskilled and this is also true for the country dummies. In the equations identifying individual components of the factors, job learning and self-management were positively related to underskilling, emphasising the need for additional training in more challenging jobs for this group of employees. When separate probits are run for each of the three age groups the results are much the same, so the experience of ageing workers about underskilling is not very different from that of the younger age groups.

5.1.3. Overeducation

Similar influences appear to be at work in relation to overeducation as for overskilling (Table 9, column 3). Overeducation is strongly and positively related to overskilling, while the coefficient on underskilling is insignificant. When the regressions are run for all age groups combined, ageing workers are significantly more likely to be overeducated than prime age workers and younger workers less so. The latter is not to be expected if the career mobility theory holds, the former either as ageing workers will receive, on average, less education than younger cohorts, given that the propensity for post-school education is rising in most countries. Unlike overskilling, experience is negative and significant, while tenure is insignificant. That is consistent with overeducated workers changing employers to obtain a better match, this being easier the more experience such workers have in the labour market. The overeducated receive more training days provided by employers, and are more likely to receive other onsite training and other forms of training, which suggests employers recognise such workers are genuinely mismatched. The overeducated are significantly more likely to have supervisory responsibilities than matched workers, to be employed in the public sector and to have a preference for working shorter hours, because they are more likely to be involved in shift-work or work at inconvenient hours and in more demanding types of work. Their jobs seem to involve fewer disamenities and more amenities than matched workers, which perhaps suggests a tendency to trade-off pay for more favourable working conditions. The cross-country comparisons suggest a greater incidence of overeducation in Germany than in most countries, exceptions being Spain, France, Hungary and Portugal.

When the regressions are split by age group, the gender dummy becomes significant, indicating that overeducation is more prevalent for older men and less prevalent for younger ones. The effects of tenure and experience are muted for ageing workers, as are the various types of training, which is to be expected given the shorter payback period for ageing workers.

5.1.4. Undereducation

The undereducated are significantly less likely to be overskilled and more often underskilled than matched workers (Table 9, column 4). They possess more experience, but do not have significantly more tenure. There is no significant difference in the incidence of undereducation between ageing and prime age workers, but unexpectedly younger workers are more likely to be undereducated than prime age workers. The undereducated receive less other onsite training than matched workers, but there is no significant difference for other forms of training. The undereducated are more often employed in temporary and part-time jobs (marginal employment) and more likely to be employed in smaller firms in the private sector, where there is less opportunity for specialisation. They are more prone to work in a demanding work environment, even though the nature of the work performed is less likely to be challenging, and have a preference for shorter hours. Most countries experience a higher incidence of undereducation than Germany, exceptions being the Czech Republic and Slovenia, where incidence is significantly lower.

When data are split by age group older males are shown to be significantly less prone to undereducation than older women. The propensity to be undereducated falls with experience and increases with tenure for ageing workers.

5.1.5. Obsolescence: factors impacting on the ability to work beyond the age of 60

Another set of regressions looks at the incidence of individuals reporting that they will not be able to do the same job when they are 60 years old. To isolate the effects of economic skill obsolescence from the physical deterioration that may be associated with the ageing process, the analysis was restricted to those not in physically-demanding jobs. In the combined regressions, males were significantly more likely to answer negatively to this question, as were ageing workers and those holding a degree-level qualification (Table 9, column 5). Very strong negative effects were also found for those with demanding types of work such as job speed and tight job deadlines, and those working with IT (in the regressions which include separate variables instead of the grouped factors). Similar negative effects were found for those in more challenging jobs and where there were various types of amenities and disamenities. Rather unsurprisingly, those with health problems were more likely to say they would not be able to do the same job when they would be 60. In most countries workers were more pessimistic about their ability to continue in work than in Germany, the reference country.

When data were split by age group, the incidence of skill mismatch had no influence on ageing workers positive or negative responses to this question, but ageing workers were more optimistic about continuing in work if they worked part-time. This might suggest these workers were in bridge jobs. Admittedly, some

answers may be influenced by early retirement provisions, but there are no questions on this aspect of employment conditions in the survey.

5.1.6. The impact of high performance work practices

One issue we wanted to address was the presumption that skill mismatch would be significantly lower in workplaces with high performance work practices (HPWPs). Aubert et al. (2006) suggest that HPWPs include practices such as self-managed teams, multitasking, just-in-time production and delivery techniques, total quality management and some decentralisation of decision-making. We take HPWPs to mean that an organisation takes a strategic approach towards managing people, recognising that the full benefits of workforce development can only be achieved by adopting a wide range of workplace changes and human resource practices that impact on performance.

Within the data set we have questions on profit sharing, company share income, performance-related pay, prospects for career advancement, regular formal work assessment, consultation on organisation of work and/or working conditions and self-managed teams. Provision of training could also be an important element of HPWPs. In practice, the provision of on-the-job training appears to reduce the likelihood of overskilling, possibly because such training increases skill utilisation in the workplace, but the group of HPWPs did not reduce the degree of skill mismatch. Other benefits derived from such practices are, for example, effects on earnings and job satisfaction (see below). Perhaps the available variables do not capture precisely the key elements of HPWPs, but the data reveal no obvious link between HPWPs and skill mismatch.

5.1.7. The impact of age and gender

The gender effects appear to be stronger for ageing workers (even if reported coefficients are statistically insignificant), with older males significantly less likely to be undereducated, but significantly more likely to be overeducated than older women. This could result from skill obsolescence, loss of job and, for men but not for women, difficulty to obtain a new one. Alternatively, this may be a simple cohort effect as men from earlier cohorts were more likely to obtain higher education than women. In the literature on gender gaps, some evidence shows that women are less disadvantaged than men in terms of reemployment. Ageing workers with first and postgraduate degrees are more likely to be overskilled. This is consistent with the findings of Neuman and Weiss (1995), who showed that obsolescence was more evident in high-tech than in low-tech industries and greater for more educated workers. However, two more recent papers suggest it is the type of education and the type of task which matter. First Weber (2010), using 11 waves of the Swiss labour force survey, shows that the type of education is more relevant to human capital depreciation than the length of education, with annual rates of depreciation being 0.7 % for men and 1.5 % for

women. In particular, academic studies seem to protect workers better against depreciation than vocational studies. Second, Janssen and Backes-Gellner (2009) use German data to show that depreciation of human capital is greater for those performing knowledge-based tasks than it is for those performing experience-based tasks. The former relate to the stock of technical knowledge, while the latter relate to experience and personal factors affecting individuals.

5.2. Impacts of mismatch

5.2.1. Wage effects

The wage data in the EWCS are grouped in 12 categories. For this reason interval regression is used to estimate human capital-based wage regressions. Data refer to net monthly income after taxes and social security contributions. This is not ideal as what we observe are not wholly market-determined wages, but incomes influenced by various tax regimes in different countries. Currency conversion is also needed for countries not in the euro system. This, however, should not affect adversely the variables of most interest as we use country dummies to pick up country-specific fixed effects ([5]). First, we estimate a parsimonious equation (an equation with as few explanatory variables as possible) which includes personal characteristics and structural features such as size of firm and public/ private sector split. In an extended model we include extra variables such as fear of job loss, whether individuals believe themselves capable of working beyond the age of 60 and whether there is a preference for shorter hours. We also include the groupings determined by factor analysis. Earnings equations are also estimated separately for each of the three age groups.

Examining the parsimonious equation estimates first (Table 13, column 1), the equations are well determined, with men earning close to 20 % more than women. There are significant returns to experience, training and hours of work. Permanent workers earn about 11 % more than temporary workers, while part-timers earn about 26 % less than full-timers. There is a positive firm size effect and a small negative return to employment in the public sector. Those with health problems earn less than those who do not and those who had sick leave over the last year earn less than those without such absences. We are, however, most interested in the skill mismatch effect on earnings after we have controlled for those other characteristics. Those who are overeducated only earn about 9 %

([5]) It is noticeable that the estimated coefficients on the country intercepts are typically much larger than the estimates reported elsewhere. Given the nature of the dependent variable, though, which is constructed to reflect constant euro prices, this is not surprising. There is, for example, no attempt to adjust for purchasing power of parity between countries, and so such country-specific fixed effects will be picked up in the country intercepts.

less than their matched counterparts and the undereducated about 8 % more than their matched counterparts, both at 1 % level of significance. In contrast, the overskilled only and the underskilled only receive no pay premium or deficit over their matched counterparts. Those who are both overeducated and overskilled earn 11 or 12 % less than their matched counterparts, while those who are both undereducated and underskilled earn about 12 % more than their matched counterparts. Thus, education mismatch has the more substantial impact on pay and for the overskilled there are no effects on pay at all.

Table 13. **Wage equations**

	(1) Specification 1	(2) Specification 2	(3) 15-29	(4) 30-49	(5) 50+
male	0.199+++	0.189+++	0.182+++	0.193+++	0.169+++
exper	0.011+++	0.010+++	0.022+++	0.009+++	0.006+++
exper2	0.000+++	0.000+++	0.000+++	0.000+++	0.000++
age1529	-0.015	-0.014			
age50p	-0.013	0.000			
tenure	0.007+++	0.005+++	0.007	0.005+++	0.008+++
tenure2	0.000+++	0.000++	0.000	0.000	0.000+++
noqual	-0.460+++	-0.307+++	-0.292++	-0.336+++	-0.342+++
primary	-0.414+++	-0.280+++	-0.308+++	-0.303+++	-0.297+++
lowsec	-0.260+++	-0.170+++	-0.176+++	-0.149+++	-0.211+++
upsec	-0.130+++	-0.092+++	-0.102+++	-0.090+++	-0.101+++
degree	0.216+++	0.179+++	0.158+++	0.191+++	0.161+++
postgrad	0.424+++	0.353+++	0.397+++	0.330+++	0.326+++
emptrain	0.002+++	0.001++	0.001	0.001++	0.001
emptrain2	0.000+++	0.000++	0.000+	0.000++	0.000
owntrain	0.000	0.000	0.001	0.000	0.000
owntrain2	0.000+	0.000	0.000+	0.000	0.000
onjobtrain	0.021+++	-0.001	-0.010	0.003	0.002
otheronsite	0.071+++	0.039+++	0.048+++	0.038+++	0.019
othertrain	0.010	0.000	0.002	-0.021	0.045++
perm	0.106+++	0.073+++	0.056+++	0.078+++	0.056+++
hours	0.005+++	0.004+++	0.004+++	0.004+++	0.005+++
parttime	-0.259+++	-0.250+++	-0.255+++	-0.242+++	-0.263+++
supervise	0.001+++	0.000++	0.002+	0.001+++	0.000
size1049	0.068+++	0.067+++	0.070+++	0.068+++	0.049+++
size5099	0.092+++	0.095+++	0.094+++	0.097+++	0.080+++
size100249	0.092+++	0.086+++	0.079+++	0.084+++	0.080+++
size250499	0.106+++	0.097+++	0.109+++	0.101+++	0.070+++
size500	0.128+++	0.109+++	0.068+++	0.121+++	0.096+++
public	-0.014+	0.003	0.024+	-0.005	0.019++
fearjobloss		-0.055+++	-0.033+++	-0.064+++	-0.049+++
fewerhours		0.048+	-0.021	0.036	0.054
health2	-0.011++	0.006	0.019	0.016++	-0.025++
health3	-0.017++	0.007	0.024	0.015	-0.016
sickleave	-0.001+++	-0.001+++	-0.001	-0.001++	0.000
sickleave2	0.000	0.000	0.000	0.000	0.000
grp1_factor1		0.015+++	0.018+++	0.011+++	0.016+++
grp2_factor1		0.006++	-0.001	0.010+++	0.006
grp2_factor2		-0.049+++	-0.042+++	-0.049+++	-0.052+++
grp3_factor1		0.042+++	0.016++	0.041+++	0.059+++
grp3_factor2		-0.010+++	-0.019+++	-0.010+++	-0.003
grp4_factor1		0.026+++	0.031+++	0.022+++	0.032+++
grp4_factor2		0.021+++	0.015++	0.024+++	0.021+++
grp5_factor1		0.002	-0.001	0.001	0.006

	(1) Specification 1	(2) Specification 2	(3) 15-29	(4) 30-49	(5) 50+
grp5_factor2		0.000	0.017+++	-0.004	-0.002
grp6_factor1		0.017+++	0.015+++	0.017+++	0.020+++
grp6_factor2		0.009+++	0.004	0.017+++	0.001
grp6_factor3		0.028+++	0.027+++	0.028+++	0.029+++
grp6_factor4		0.015+++	0.009	0.007++	0.026+++
Austria	-0.027+	-0.046+++	-0.030	-0.040+	-0.071+
Belgium	-0.060+++	-0.069+++	-0.064+	-0.074+++	-0.038
Bulgaria	-2.463+++	-2.432+++	-2.295+++	-2.442+++	-2.488+++
Croatia	-1.076+++	-1.063+++	-0.997+++	-1.065+++	-1.112+++
Cyprus	-0.123+++	-0.130+++	-0.206+++	-0.141+++	-0.050
Czech Republic	-1.230+++	-1.223+++	-1.141+++	-1.237+++	-1.264+++
Denmark	0.269+++	0.228+++	0.246+++	0.241+++	0.186+++
Estonia	-1.629+++	-1.616+++	-1.360+++	-1.635+++	-1.740+++
Finland	-0.069+++	-0.091+++	0.038	-0.106+++	-0.143+++
France	-0.065+++	-0.070+++	-0.022	-0.077+++	-0.085++
Greece	-0.436+++	-0.406+++	-0.485+++	-0.380+++	-0.383+++
Hungary	-1.435+++	-1.435+++	-1.366+++	-1.469+++	-1.428+++
Ireland	0.320+++	0.296+++	0.295+++	0.307+++	0.288+++
Italy	-0.241+++	-0.244+++	-0.258+++	-0.267+++	-0.148+++
Latvia	-1.991+++	-1.969+++	-1.756+++	-1.939+++	-2.128+++
Lithuania	-1.917+++	-1.862+++	-1.639+++	-1.872+++	-1.944+++
Luxembourg	0.468+++	0.434+++	0.328+++	0.447+++	0.512+++
Malta	-0.567+++	-0.587+++	-0.578+++	-0.593+++	-0.571+++
Netherlands	0.058+++	-0.002	-0.026	-0.035	0.032
Norway	3.232+++	3.189+++	3.225+++	3.197+++	3.151+++
Poland	-1.564+++	-1.541+++	-1.476+++	-1.555+++	-1.545+++
Portugal	-0.646+++	-0.674+++	-0.648+++	-0.670+++	-0.657+++
Romania	-2.285+++	-2.276+++	-2.267+++	-2.295+++	-2.218+++
Slovakia	-1.620+++	-1.608+++	-1.512+++	-1.630+++	-1.619+++
Slovenia	-0.844+++	-0.858+++	-0.765+++	-0.869+++	-0.906+++
Spain	-0.309+++	-0.293+++	-0.272+++	-0.343+++	-0.211+++
Sweden	0.056+++	0.010	0.068++	-0.002	-0.013
Switzerland	0.644+++	0.611+++	0.556+++	0.596+++	0.650+++
Turkey	-1.404+++	-1.413+++	-1.352+++	-1.403+++	-1.468+++
UK	0.203+++	0.188+++	0.241+++	0.169+++	0.163+++
nojobat60		0.021	0.042+	0.018	0.015
overedonly	-0.099+++	-0.087+++	-0.096+++	-0.068+++	-0.110+++
overskonly	-0.009	-0.009	-0.025++	-0.010	-0.001
bothover	-0.127+++	-0.102+++	-0.113+++	-0.087+++	-0.112+++
underedonly	0.124+++	0.075+++	0.089+++	0.075+++	0.065
underskonly	0.001	-0.016+	-0.051+++	-0.011	0.007
bothunder	0.138+++	0.070+++	-0.026	0.066++	0.129+++
constant	6.734+++	6.812+++	6.716+++	6.836+++	6.868+++
Observations	18 109	18 109	3 568	9 888	4 629

NB: dependent variable is lnmonthpay; +, ++, +++ denotes statistical significance at the 90 %, 95 %, 99 % confidence levels respectively. Variable names are in Annex 1.

Source: EWCS 2005.

In the extended model, which includes the factor groupings (Table 13, column 2), those fearing job loss receive about 6 % lower pay than those who do not, while those who prefer to work shorter hours receive about 5 % more than those happy with their hours. The factor groupings are all significant with a positive return to shift-work, more challenging work, HPWPs and amenities and a negative

return to more demanding work and disamenities ([6]).This does not accord with the notion of compensating wage differentials. While significance remains, the returns to overeducation only fall from 9 to 8 % with the introduction of the additional variables, while the premium to undereducation is almost halved. This implies that the undereducated tend to be employed in jobs which pay less, *ceteris paribus*.

Turning finally to the regressions split by age group (Table 13, columns 3-5), the effects are in the main similar for ageing workers as for the younger age groups, but in some cases the effects are muted with the results for the over-skilled only and underskilled only, as well as those who are both undereducated and underskilled being insignificant. However, there are still strong wage effects for skill mismatch among ageing workers.

5.2.2. Factors impacting on job satisfaction

The EWCS asks respondents whether they are on the whole, very satisfied, satisfied, not very satisfied or not at all satisfied with working conditions in their main paid job. After experimentation it was found that splitting the sample into two groups of satisfied and dissatisfied workers produced the most meaningful results and a probit model was therefore adopted. We follow the procedure of first running a parsimonious model, followed by an extended model and then separate regressions split by age group (Table 14). In line with some earlier studies we find that women are more likely to be satisfied than men, but ageing workers are just as likely to be satisfied as prime age workers. In general, job satisfaction is more likely with longer tenure and receipt of training, where jobs are permanent, hours are shorter, work is full-time, workers have supervisory responsibilities and they are in good health. Higher job satisfaction is less likely the larger the firm, but more likely in the public sector *ceteris paribus*. There are also significant differences in the extent of job satisfaction across countries. Both overskilled and underskilled workers are significantly less likely to be satisfied than those matched by skill, while the educational mismatch variables on their own are insignificant (apart from undereducation in the parsimonious model).

Turning to the extended model, some variables lose significance. Those fearing job loss, saying that they may not be able to continue in work beyond the age of 60 and who would prefer to work shorter hours are less likely to be satisfied. There is a negative relationship between shift-working, more demanding types of work and disamenities and the likelihood of being satisfied and a positive relationship between the presence of HPWPs and amenities and being satisfied ([7]). The negative relationship between overskilling and satisfaction remains and underskilling becomes negative and highly significant. Splitting the sample by age group does not materially change these results.

([6]) See Annex 2 for an explanation of the factor groupings.

([7]) Annex 2 provides an overview of the factors mentioned.

Table 14. **Job satisfaction: all countries**

	(1) Specification 1	(2) Specification 2	(3) 15-29	(4) 30-49	(5) 50+
male	-0.027	-0.063++	-0.048	-0.055	-0.152+++
exper	-0.001	-0.003	-0.006	-0.004	-0.015
exper2	0.000	0.000+	0.000	0.000	0.000
age1529	-0.060	-0.055			
age50p	-0.034	-0.007			
tenure	0.012+++	0.004	-0.072+++	0.020+++	0.000
tenure2	0.000++	0.000	0.008+++	-0.001+++	0.000
noqual	-0.600+++	-0.132	0.027	-0.018	-0.501++
primary	-0.391+++	-0.010	-0.218	0.092	-0.178
lowsec	-0.207+++	0.058	0.028	0.085	-0.050
upsec	-0.106+++	0.016	-0.089	0.025	0.073
degree	0.087++	-0.064	-0.142	-0.049	-0.024
postgrad	0.027	-0.218++	-0.066	-0.212+	-0.288
emptrain	0.005+++	0.001	0.002	0.001	-0.003
emptrain2	0.000+++	0.000	0.000	0.000	0.000
owntrain	-0.002	-0.003+	-0.006+	0.000	-0.015++
owntrain2	0.000	0.000	0.000	0.000	0.000++
onjobtrain	0.099+++	0.036	0.103+	0.002	0.066
otheronsite	0.090+++	-0.003	-0.030	0.034	-0.027
othertrain	-0.050	-0.059	-0.047	-0.113	0.049
perm	0.153+++	0.031	0.045	0.033	0.068
hours	-0.007+++	-0.003++	-0.003	-0.003+	-0.004
parttime	-0.187+++	-0.094++	-0.200++	-0.117++	0.033
supervise	0.004+++	0.002++	0.001	0.003+	0.000
size1049	-0.031	0.013	0.053	0.006	0.005
size5099	-0.137+++	-0.010	0.029	-0.055	0.052
size100249	-0.078+	0.044	0.155	-0.010	0.075
size250499	-0.133++	0.032	0.005	0.067	-0.011
size500	-0.165+++	-0.025	-0.088	-0.016	-0.009
public	0.063+++	0.003	-0.011	0.014	-0.009
fearjobloss		-0.345+++	-0.454+++	-0.261+++	-0.468+++
fewerhours		-0.229+	-0.057	-0.268	-0.293
health2	-0.695+++	-0.528+++	-0.486+++	-0.525+++	-0.586+++
health3	-0.889+++	-0.680+++	-0.752+++	-0.687+++	-0.647+++
sickleave	-0.005+++	-0.004+++	-0.002	-0.004++	-0.005+++
sickleave2	0.000+++	0.000+	0.000	0.000	0.000+
grp1_factor1		-0.063+++	-0.061++	-0.065+++	-0.048+
grp2_factor1		-0.079++	-0.092+++	-0.075+++	-0.071+++
grp2_factor2		-0.035+++	-0.039	-0.035+	-0.041
grp3_factor1		0.009	0.046	0.005	-0.030
grp3_factor2		-0.051+++	-0.036	-0.057+++	-0.037
grp4_factor1		0.035+++	-0.008	0.042++	0.069++
grp4_factor2		0.120+++	0.116+++	0.148+++	0.059++
grp5_factor1		-0.089+++	-0.072+++	-0.102+++	-0.085+++
grp5_factor2		-0.052+++	-0.038	-0.057+++	-0.076+++
grp6_factor1		0.279+++	0.269+++	0.277+++	0.307+++
grp6_factor2		0.150+++	0.102+++	0.166+++	0.169+++
grp6_factor3		0.135+++	0.110+++	0.113+++	0.215+++
grp6_factor4		-0.027++	-0.020	-0.027	-0.027
Austria	0.317+++	0.213+	0.589++	0.122	-0.082
Belgium	-0.024	-0.071	-0.158	-0.143	0.029
Bulgaria	-0.544+++	-0.656+++	-0.425++	-0.873+++	-0.468+++
Croatia	-0.359+++	-0.416+++	-0.144	-0.562+++	-0.439++
Cyprus	0.061	-0.079	-0.142	-0.105	-0.008
Czech Republic	-0.307+++	-0.419+++	-0.315+	-0.516+++	-0.426++
Denmark	0.383+++	0.144	0.523++	-0.083	0.359+
Estonia	-0.312+++	-0.389+++	-0.087	-0.636+++	-0.286

	(1) Specification 1	(2) Specification 2	(3) 15-29	(4) 30-49	(5) 50+
Finland	-0.119	-0.281+++	0.066	-0.508+++	-0.117
France	-0.232+++	-0.265+++	0.052	-0.404+++	-0.276
Greece	-0.490+++	-0.460+++	-0.139	-0.612+++	-0.517++
Hungary	-0.277+++	-0.367+++	0.127	-0.497+++	-0.520+++
Ireland	-0.027	-0.276+++	-0.130	-0.387+++	-0.211
Italy	-0.443+++	-0.563+++	-0.245	-0.658+++	-0.718+++
Latvia	-0.438+++	-0.587+++	-0.501+++	-0.677+++	-0.620+++
Lithuania	-0.645+++	-0.657+++	-0.506++	-0.908+++	-0.366+
Luxembourg	0.006	-0.165	-0.055	-0.336++	0.140
Malta	-0.134	-0.353+++	-0.104	-0.588+++	-0.148
Netherlands	-0.040	-0.280+++	0.222	-0.434+++	-0.331+
Norway	0.399+++	0.216++	0.242	0.210	0.202
Poland	0.008	-0.054	0.316+	-0.248+	-0.048
Portugal	0.117	-0.107	0.151	-0.287++	-0.006
Romania	-0.514+++	-0.613+++	-0.557+++	-0.692+++	-0.592+++
Slovakia	-0.280+++	-0.391+++	-0.208	-0.597+++	-0.172
Slovenia	-0.283+++	-0.360+++	-0.057	-0.539+++	-0.284
Spain	-0.232+++	-0.324+++	-0.331++	-0.311++	-0.201
Sweden	0.059	-0.233++	0.216	-0.413+++	-0.199
Switzerland	0.202++	-0.008	-0.026	-0.173	0.289
Turkey	-0.422+++	-0.336+++	-0.365++	-0.442+++	0.274
UK	0.271+++	0.123	0.615+++	-0.004	-0.125
nojobat60		-0.206+++	-0.103	-0.230+++	-0.218++
overedonly	-0.081	0.001	-0.059	0.006	0.056
overskonly	-0.160+++	-0.113+++	-0.205+++	-0.068+	-0.116++
bothover	-0.326+++	-0.123+++	-0.140	-0.137+	-0.130
underedonly	0.198+++	0.047	0.137	0.002	0.145
underskonly	-0.072+	-0.073+++	-0.079	-0.063	-0.093
bothunder	0.110	-0.002	0.171	0.128	-0.271
constant	1.664+++	1.786+++	1.692+++	1.836+++	1.927+++
Observations	19 905	19 905	3 914	10 873	5 088

NB: dependent variable is satisfied; +, ++, +++ denotes statistical significance at the 90 %, 95 %, 99 % confidence levels respectively.

Source: EWCS 2005.

5.2.3. Analysing career prospects

Respondents were asked whether their job offered good prospects for career advancement. The career prospects of ageing workers are found to be significantly lower than those in the younger age groups (Table 15). This is unsurprising given the shorter time to retirement. Positive answers are more likely to be given by men, the more educated, those receiving training, in permanent and full-time jobs and in good health. Overeducation and underskilling are significant and positively associated with career prospects in the parsimonious model, but in the extended model the overeducation variable lost significance, suggesting that the overeducated tend to be employed in jobs offering fewer career prospects. Workers are more likely to say good career prospects are where HPWPs are evident. In the equations split by age there are no gender differences for ageing workers. In this case, both overskilling and underskilling are associated with a perception of positive career prospects, but it is not the case for educational mismatch. The relationship between mismatch and career prospects is, therefore, somewhat confused.

Table 15. **Career prospects: all countries**

	(1) Specification 1	(2) Specification 2	(3) 15-29	(4) 30-49	(5) 50+
male	0.153+++	0.122+++	0.208+++	0.121+++	-0.011
exper	-0.016+++	-0.022+++	-0.009	-0.023+++	0.001
exper2	0.000+++	0.000+++	0.000	0.000	0.000
age1529	0.188+++	0.221+++			
age50p	-0.232+++	-0.211+++			
tenure	-0.013+++	-0.021+++	-0.079+++	-0.021+++	-0.013+
tenure2	0.000+++	0.001+++	0.004++	0.001++	0.000++
noqual	-0.826+++	-0.228	-0.943+	-0.536++	0.306
primary	-0.622+++	-0.119+	-0.294	-0.125	-0.081
lowsec	-0.425+++	-0.093+	-0.130	-0.095	-0.075
upsec	-0.243+++	-0.102+++	-0.149+	-0.131++	0.021
degree	0.152+++	0.009	0.000	0.011	0.035
postgrad	0.315+++	0.064	0.055	0.039	0.168
emptrain	0.011+++	0.008+++	0.010+++	0.007+++	0.010++
emptrain2	0.000+++	0.000+++	0.000	0.000+++	0.000++
owntrain	-0.002	-0.003+	-0.003	-0.003	-0.008
owntrain2	0.000	0.000	0.000	0.000	0.000
onjobtrain	0.199+++	0.124+++	0.197+++	0.099+++	0.139++
otheronsite	0.169+++	0.046+	0.020	0.063+	0.017
othertrain	0.085+	0.051	0.061	0.065	-0.049
perm	0.168+++	0.052+	-0.008	0.078++	0.172++
hours	0.001	0.000	0.000	0.000	-0.002
parttime	-0.236+++	-0.186+++	-0.145	-0.235+++	-0.055
supervise	0.001++	0.001	0.005	0.001+	0.000
size1049	0.081+++	0.087+++	0.046	0.116+++	0.094
size5099	0.018	0.059	-0.008	0.025	0.192++
size100249	0.074++	0.098++	0.075	0.165+++	-0.028
size250499	0.099++	0.109++	0.018	0.091	0.238++
size500	0.204+++	0.211+++	0.103	0.279+++	0.171+
public	-0.034	0.004	-0.096	-0.031	0.136++
fearjobloss		-0.222+++	-0.276+++	-0.223+++	-0.140+
fewerhours		-0.180	-0.085	-0.173	-0.339
health2	-0.281+++	-0.224+++	-0.381+++	-0.204+++	-0.147++
health3	-0.358+++	-0.274+++	-0.312+++	-0.248+++	-0.287+++
sickleave	-0.004+++	-0.004+++	-0.004	-0.002	-0.006+++
sickleave2	0.000++	0.000++	0.000+	0.000	0.000++
grp1_factor1		0.008	0.000	0.018	0.007
grp2_factor1		0.019+	0.023	-0.002	0.061++
grp2_factor2		-0.100+++	-0.083+++	-0.095+++	-0.138+++
grp3_factor1		0.149+++	0.183+++	0.163+++	0.085++
grp3_factor2		-0.031+++	-0.045+	-0.029+	-0.032
grp7_factor1		0.059+++	0.053++	0.076+++	0.041++
grp7_factor2		0.107+++	0.106+++	0.103+++	0.120+++
grp5_factor1		-0.024+	-0.040	-0.032+	0.026
grp5_factor2		-0.004	-0.024	0.010	-0.021
grp6_factor1		0.217+++	0.255+++	0.184+++	0.270+++
grp6_factor2		0.122+++	0.073+++	0.118+++	0.184+++
grp6_factor3		0.139+++	0.130+++	0.129+++	0.189+++
grp6_factor4		0.109+++	0.117+++	0.112+++	0.115+++
Austria	0.003	-0.126	-0.189	-0.057	-0.209
Belgium	-0.102	-0.103	0.013	-0.117	-0.237
Bulgaria	0.003	0.127	0.270	0.055	0.129
Croatia	-0.208+++	-0.152+	0.144	-0.163	-0.622+++
Cyprus	0.351+++	0.363+++	0.336+	0.375+++	0.409++
Czech Republic	-0.212+++	-0.236+++	-0.071	-0.187+	-0.654+++
Denmark	0.120+	-0.076	-0.005	-0.116	-0.139
Estonia	-0.395+++	-0.384+++	-0.446++	-0.406+++	-0.401++

	(1) Specification 1	(2) Specification 2	(3) 15-29	(4) 30-49	(5) 50+
Finland	-0.029	-0.146+	0.238	-0.246++	-0.289+
France	0.177++	0.253+++	0.359+++	0.250++	0.019
Greece	0.027	0.182++	0.259	0.171	0.192
Hungary	-0.348+++	-0.336+++	-0.353++	-0.344+++	-0.405++
Ireland	0.368+++	0.286+++	0.513+++	0.257++	0.114
Italy	-0.144+	-0.079	0.073	-0.093	-0.264
Lithuania	-0.453+++	-0.297+++	-0.284	-0.330+++	-0.339+
Luxembourg	0.214++	0.150+	0.050	0.199+	0.035
Latvia	-0.166+	-0.119	0.063	-0.155	-0.277+
Malta	0.294++	0.199++	0.129	0.282++	0.213++
Netherlands	-0.007	-0.235+++	-0.162	-0.210++	-0.383
Norway	-0.162++	-0.343+++	-0.317+	-0.383++	-0.401++
Poland	-0.149+	-0.070	0.166	-0.166	-0.099
Portugal	0.408+++	0.343+++	0.270+	0.414	0.348++
Romania	-0.214+++	-0.210++	-0.152	-0.144++	-0.500++
Slovakia	-0.499+++	-0.475+++	-0.153	-0.580	-0.630+++
Slovenia	0.093	0.109	0.465+++	-0.030+++	0.174
Spain	0.043	0.118	0.164	0.138	0.065
Sweden	-0.116	-0.333+++	-0.381++	-0.378+++	-0.373++
Switzerland	-0.018	-0.155++	0.120	-0.133	-0.390++
Turkey	0.158	0.242+	0.164	0.294	0.685++
UK	0.350+++	0.293+++	0.757+++	0.328+++	-0.308+
nojobat60		-0.143+++	-0.101	-0.152+++	-0.147
overedonly	-0.104++	-0.045	-0.036	-0.039	-0.090
overskonly	0.023	0.029	-0.059	0.008	0.195+++
bothover	-0.175+++	-0.058	-0.021	-0.126+	0.084
underedonly	0.269+++	0.086++	0.147	0.130++	-0.013
underskonly	0.233+++	0.199+++	0.397+++	0.092++	0.277+++
bothunder	0.473+++	0.234+++	0.673+++	-0.050	0.357++
constant	-0.512+++	-0.323+++	-0.100	-0.294++	-0.962+++
Observations	20 018	20 018	3 940	10 923	5 124

NB: dependent variable is careerpros; +, ++, +++ denotes statistical significance at the 90 %, 95 %, 99 % confidence levels respectively.

Source: EWCS 2005.

5.2.4. Fear of job loss

Fear of job loss might be regarded as the mirror image of good career prospects, but in both cases men are significantly more likely to believe they may be affected than women (Table 16). This might be caused by differences in occupation and sector distributions. Ageing workers are no more or less likely to fear job loss than the other age groups. This could be influenced by last-in first-out redundancy policies protecting ageing workers from job loss. There are no questions on these policies in the data set, therefore we cannot judge their importance. Overeducation or undereducation has no impact on the fear of job loss either, though overskilling and underskilling increase the fear of job loss for all age groups combined. This is consistent with the findings of McGuinness and Wooden (2009) for Australia. For ageing workers, however, underskilling has no effect on the fear of job loss.

Fear of job loss is lower in the public sector for all age groups. It is higher for ageing workers working with IT and ageing workers with poor health. It is significantly lower when the job is permanent, when family friendly policies and

job quality standards are used. Given substantial differences in unemployment rates, differences in the fear of job loss across countries are significant.

Table 16. **Fear of job loss: all countries**

	(1) Specification 1	(2) Specification 2	(3) 15-29	(4) 30-49	(5) 50+
male	0.055++	0.051++	0.058	-0.010	0.180+++
exper	0.001	0.002	0.028++	-0.005	-0.009
exper2	0.000	0.000	-0.001+++	0.000	0.000
age1529	-0.103++	-0.121+++			
age50p	0.034	0.041			
tenure	-0.038+++	-0.037+++	-0.074+++	-0.044+++	-0.025+++
tenure2	0.001+++	0.001+++	0.001	0.001+++	0.000++
noqual	0.262+	0.124	0.344	0.023	0.226
primary	0.211+++	0.091	0.316+	0.110	0.021
lowsec	0.139+++	0.054	0.145	0.097	-0.056
upsec	0.095++	0.058	0.195+	0.066	-0.063
degree	-0.100++	-0.047	0.046	-0.017	-0.225+++
postgrad	-0.184+	-0.118	-0.009	-0.141	-0.197
emptrain	-0.005+++	-0.004++	-0.001	-0.006+++	0.004
emptrain2	0.000+++	0.000++	0.000	0.000+++	0.000
owntrain	0.000	0.000	-0.004	0.001	0.009
owntrain2	0.000	0.000	0.000	0.000	0.000
onjobtrain	-0.028	-0.023	0.085	-0.050	-0.051
otheronsite	-0.033	-0.003	-0.112	0.006	0.058
othertrain	0.026	0.030	0.095	0.014	0.013
perm	-0.537+	-0.526+++	-0.587+++	-0.522+++	-0.414+++
hours	0.003++	0.001	0.002	0.002	-0.003
parttime	0.112+++	0.112+++	0.205++	0.090	0.049
supervise	-0.001	0.000	0.004+	0.000	0.000
size1049	-0.016	-0.053+	-0.012	-0.070+	-0.090
size5099	0.065	-0.007	0.040	-0.077	0.077
size100249	0.085++	0.017	0.143	0.009	-0.073
size250499	0.159+++	0.072	0.238+	0.036	0.015
size500	0.081+	-0.006	-0.155	0.032	-0.054
public	-0.168+++	-0.143+++	-0.047	-0.135+++	-0.245+++
fewerhours		-0.155	-0.288	-0.178	-0.040
health2	0.247+++	0.154+++	0.146++	0.152+++	0.169+++
health3	0.336+++	0.219+++	0.219++	0.267+++	0.124+
sickleave	0.003+++	0.003++	0.001	0.001	0.006+++
sickleave2	0.000+	0.000	0.000	0.000	0.000++
grp1_factor1		0.028++	0.053+	0.026	0.026
grp2_factor1		0.029++	0.037	0.025	0.030
grp2_factor2		-0.040+++	-0.065++	-0.020	-0.071++
grp3_factor1		0.001	0.022	-0.017	0.027
grp3_factor2		0.025++	0.017	0.018	0.032
grp4_factor1		-0.024+	-0.016	-0.025	-0.030
grp4_factor2		-0.003	-0.013	0.000	0.008
grp5_factor1		0.096+++	0.091+++	0.103+++	0.088+++
grp5_factor2		0.036+++	0.065+++	0.018	0.056++
grp6_factor1		-0.108+++	-0.151+++	-0.091+++	-0.114+++
grp6_factor2		-0.024++	-0.006	-0.026	-0.049++
grp6_factor3		-0.060+++	-0.078+++	-0.048+++	-0.076+++
grp6_factor4		-0.001	0.011	-0.002	0.009
Austria	-0.250+++	-0.226++	-0.033	-0.249++	-0.432+
Belgium	-0.071	-0.060	0.103	-0.105	-0.157
Bulgaria	0.293+++	0.295+++	0.497++	0.235++	0.258
Croatia	0.161+	0.139	0.291	0.074	0.132
Cyprus	-0.209++	-0.219++	-0.089	-0.369+++	-0.075

	(1) Specification 1	(2) Specification 2	(3) 15-29	(4) 30-49	(5) 50+
Czech Republic	0.462+++	0.502+++	0.463++	0.412+++	0.714+++
Denmark	-0.344+++	-0.279+++	0.044	-0.390+++	-0.239
Estonia	0.275+++	0.269+++	0.225	0.074	0.540+++
Finland	0.073	0.097	0.423++	-0.070	0.143
France	-0.301+++	-0.306+++	0.179	-0.398+++	-0.636+++
Greece	0.267+++	0.205++	0.465++	0.112	0.150
Hungary	0.285+++	0.279+++	0.392++	0.213+	0.240
Ireland	-0.404+++	-0.349+++	-0.059	-0.507+++	-0.319
Italy	-0.189++	-0.153	0.159	-0.186	-0.517++
Latvia	0.189++	0.209++	0.166	0.124	0.329+
Lithuania	0.458+++	0.408+++	0.560++	0.295++	0.479+++
Luxembourg	-0.469+++	-0.437+++	-0.250	-0.501+++	-0.555+
Malta	-0.123	-0.094	0.088	-0.098	-0.159
Netherlands	0.225+++	0.283+++	0.521++	0.253++	0.128
Norway	-0.363+++	-0.318+++	0.002	-0.422+++	-0.448++
Poland	0.490+++	0.521+++	0.775+++	0.499+++	0.218
Portugal	0.124	0.206++	0.544+++	0.091	-0.011
Romania	0.097	0.097	0.206	-0.005	0.182
Slovakia	0.008	0.031	-0.008	-0.004	0.066
Slovenia	0.416+++	0.420+++	0.656+++	0.396+++	0.182
Spain	-0.157+	-0.165+	-0.002	-0.257+	-0.177
Sweden	0.266+++	0.380+++	0.868+++	0.272++	0.270+
Switzerland	0.060	0.137	0.065	0.194+	-0.040
Turkey	-0.044	-0.090	0.141	-0.125	-0.905+++
UK	-0.409+++	-0.380+++	-0.645++	-0.303++	-0.423++
nojobat60		0.107++	-0.044	0.158++	0.130
overedonly	0.069	0.038	0.252++	-0.066	0.098
overskonly	0.109+++	0.095+++	0.127++	0.067+	0.127++
bothover	0.255+++	0.183+++	0.138	0.177++	0.302++
underedonly	-0.041	0.009	0.088	0.054	-0.081
underskonly	0.192+++	0.188+++	0.224+++	0.202+++	0.077
bothunder	0.013	0.039	0.065	0.171	-0.253
constant	-0.818+++	-0.726+++	-1.295+++	-0.569+++	-0.410
Observations	20 018	20 018	3 940	10 923	5 124

NB: dependent variable is fearjobloss; +, ++, +++ denotes statistical significance at the 90 %, 95 %, 99 % confidence levels respectively.

Source: EWCS 2005.

5.2.5. Health issues

Workers are more likely to have health problems as they get older. We have already observed that there is some relationship between health problems and skill mismatch, but causation could go either way, health problems increasing the likelihood of skill mismatch, or skill mismatch giving rise to health problems. The EWCS asks respondents whether they have a health problem and if this led them to take time off in the past 12 months. A further question asks the number of days taken off for health problems in the past 12 months. Cottini and Lucifora (2010) investigated the effect of working conditions on mental health using the 1995, 2000 and 2005 EWCSs for 15 countries. Their indicator of mental health includes stress, sleeping problems, anxiety and irritability. They use simple probit and ordered probit analysis and deal with heterogeneity by allowing thresholds to vary according to certain personal characteristics, but also with endogeneity by using instrumental variables. Adverse working conditions such as shift-work, complex and intensive tasks and restricted job autonomy lead to a higher probability of

reporting mental health problems. Using instruments increases the size of these effects. We test these relationships by using both a multinomial probit, with no health problems as the base outcome, and ordered probit approaches, though we only report the latter results in detail (Table 17). The multinomial probit results show that men are more likely than women to have health problems with no consequential absence, but less likely to have health problems resulting in absences. The same applies to ageing workers as a whole compared to younger workers. Turning to the ordered probit results, overskilled and underskilled workers are both more likely to have health problems than matched workers. This is not the case for educational mismatch. However, these variables are not significant for ageing workers, also no more likely to report health problems than younger workers, which is consistent with Cottini and Lucifora's results. However, a 'healthy worker effect' might be at play here, with workers having health problems exiting the workforce earlier than those that have no health problems. Shift-work, job intensity, job complexity and job disamenities are all associated with a higher propensity to report health problems, regardless of age, while the presence of job amenities tends to reduce it. We can conclude that improving the quality of jobs is good for health.

Table 17. **Health equations: all countries**

	(1) Specification 1	(2) Specification 2	(3) 15-29	(4) 30-49	(5) 50+
male	-0.016	-0.090+++	-0.089++	-0.069+++	-0.113+++
exper	0.013+++	0.012+++	0.030+++	0.000	0.019++
exper2	0.000+++	0.000+++	0.000+++	0.000	0.000++
age1529	-0.036	-0.067++			
age50p	-0.042	-0.014			
tenure	0.016+++	0.016+++	0.032+	0.019+++	0.019+++
tenure2	0.000+++	0.000+++	-0.002	-0.001+++	0.000+++
noqual	0.555+++	0.215+	-0.052	0.333+	0.208
primary	0.310+++	-0.007	-0.020	0.063	-0.082
lowsec	0.200+++	0.004	-0.052	0.043	-0.024
upsec	0.038	-0.036	0.011	-0.008	-0.122+
degree	-0.109+++	0.043	0.120	0.065	-0.035
postgrad	-0.175+++	0.012	0.124	0.041	-0.088
emptrain	-0.001	0.001	0.000	0.001	-0.003
emptrain2	0.000	0.000	0.000	0.000	0.000
owntrain	0.003++	0.003+	0.008++	0.001	0.003
owntrain2	0.000	0.000	0.000	0.000	0.000
onjobtrain	0.076+++	0.052++	0.062	0.041	0.084+
otheronsite	0.020	0.062++	0.064	0.085++	0.022
othertrain	0.058	0.051	0.089	0.040	0.041
perm	0.081+++	0.153+++	0.122++	0.143+++	0.172+++
hours	0.011+++	0.004+++	0.011+++	0.003++	0.001
parttime	0.028	-0.067++	0.017	-0.065	-0.120+
supervise	-0.001++	-0.001	-0.013+	0.000	-0.002++
size1049	0.162+++	0.100+++	0.067	0.107+++	0.102++
size5099	0.218+++	0.094+++	0.177++	0.090++	0.048
size100249	0.152+++	0.041	0.041	0.039	0.042
size250499	0.215+++	0.055	0.158	0.022	0.072
size500	0.217+++	0.067+	0.041	0.077	0.049
public	0.072+++	0.105+++	0.139++	0.120+++	0.038

	(1) Specification 1	(2) Specification 2	(3) 15-29	(4) 30-49	(5) 50+
fearjobloss		0.185+++	0.151+++	0.199+++	0.182+++
fewerhours		0.517+++	-0.130	0.588+++	0.506+++
grp1_factor1		0.101+++	0.084+++	0.096+++	0.135+++
grp2_factor1		0.110+++	0.114+++	0.105+++	0.125+++
grp2_factor2		0.126+++	0.109+++	0.126+++	0.141+++
grp3_factor1		0.065+++	0.103+++	0.049+++	0.080+++
grp3_factor2		0.078+++	0.073+++	0.078+++	0.072+++
grp4_factor1		-0.004	0.009	-0.004	-0.011
grp4_factor2		0.005	-0.010	0.006	0.017
grp5_factor1		0.204+++	0.212+++	0.205+++	0.197+++
grp5_factor2		0.126+++	0.128+++	0.136+++	0.100+++
grp6_factor1		-0.065+++	-0.066+++	-0.062+++	-0.078+++
grp6_factor2		-0.082+++	-0.073+++	-0.087+++	-0.078+++
grp6_factor3		-0.078+++	-0.080+++	-0.087+++	-0.054+++
grp6_factor4		0.056+++	0.046++	0.058+++	0.062+++
Austria	0.185++	0.178++	0.170	0.206+	0.143
Belgium	0.266+++	0.240+++	0.241	0.260++	0.256
Bulgaria	0.496+++	0.407+++	0.185	0.441+++	0.506+++
Croatia	0.487+++	0.418+++	0.160	0.492+++	0.547+++
Cyprus	0.399+++	0.337+++	0.179	0.470+++	0.200
Czech Republic	0.273+++	0.296+++	0.326+	0.357+++	0.176
Denmark	0.661+++	0.685+++	0.597+++	0.767+++	0.613+++
Estonia	0.868+++	0.774+++	0.773+++	0.744+++	0.847+++
Finland	0.645+++	0.538+++	0.286	0.682+++	0.420+++
France	0.126++	0.008	-0.268	0.132	-0.078
Greece	0.879+++	0.643+++	0.549+++	0.776+++	0.313++
Hungary	0.395+++	0.343+++	0.226	0.389+++	0.350++
Ireland	0.151+	0.262+++	0.142	0.345+++	0.212
Italy	0.453+++	0.484+++	0.381++	0.575+++	0.427+++
Latvia	0.886+++	0.845+++	0.907+++	0.859+++	0.829+++
Lithuania	0.622+++	0.516+++	0.463++	0.586+++	0.484+++
Luxembourg	0.357+++	0.410+++	0.380++	0.404+++	0.554+++
Malta	0.747+++	0.695+++	0.623+++	0.820+++	0.565+++
Netherlands	0.272+++	0.330+++	0.390+	0.446+++	0.130
Norway	0.684+++	0.636+++	0.543+++	0.711+++	0.557+++
Poland	0.776+++	0.710+++	0.560+++	0.813+++	0.657+++
Portugal	0.129+	0.195+++	0.132	0.132	0.413+++
Romania	0.395+++	0.234+++	0.216	0.305+++	0.114
Slovakia	0.535+++	0.585+++	0.398++	0.616+++	0.688+++
Slovenia	0.858+++	0.781+++	0.771+++	0.818+++	0.772+++
Spain	0.234+++	0.205+++	0.315++	0.205+	0.082
Sweden	0.759+++	0.839+++	0.879+++	1.006+++	0.626+++
Switzerland	0.181++	0.232+++	0.162	0.358+++	0.058
Turkey	0.322+++	0.132	0.148	0.096	-0.030
UK	-0.089	-0.028	-0.255	0.014	0.051
nojobat60		0.260+++	0.121	0.283+++	0.257+++
overedonly	0.034	-0.019	-0.039	-0.013	-0.002
overskonly	0.126+++	0.083+++	0.156+++	0.069++	0.061
bothover	0.189+++	0.076	0.113	0.107	-0.017
underedonly	-0.187+++	-0.058	-0.021	-0.074	-0.052
underskonly	0.160+++	0.118+++	0.073	0.141+++	0.129++
bothunder	0.042	0.105+	0.135	0.100	0.102
Observations	20 018	20 018	3 940	10 923	5 124

NB: dependent variable is health; +, ++, +++ denotes statistical significance at the 90 %, 95 %, 99 % confidence levels respectively.

Source: EWCS 2005.

6. Conclusions

There are significant differences across countries in the causes and effects of labour-market mismatch and differences across age groups which make generalisations hazardous. Educational and skill mismatch also seem to have different causes and effects. In general, overeducation on its own results in a pay penalty and undereducation on its own in a pay premium. Overskilling and underskilling on their own do not appear to affect pay. Thus educational mismatch has more negative income consequences for workers. However, the overskilled are significantly less likely to be satisfied at work than their matched counterparts. It is not the case for the overeducated. Further, in the extended model the underskilled are less likely to be satisfied in their job than their matched counterparts. Taking these wage and job satisfaction results together, skill mismatch seems to be of more concern from a policy perspective than educational mismatch, as the educationally mismatched seem satisfied with their state, suggesting that there may be a tendency to trade-off educational matching for other aspects of employment such as job location and job conditions. This is reinforced by the fact that those subject to skill mismatch are more likely to have health problems than matched workers unlike the case for those who are educationally mismatched

The effects of undereducation and underskilling vary by age group, with ageing workers significantly less likely to be overskilled and more likely to be overeducated. Overeducation and overskilling also have different effects on perceived career prospects and fear of job loss. Ageing workers are significantly less likely to believe that they have career prospects when compared to prime age workers, and particularly so if they are undereducated, but there are no significant differences about fear of job loss. However, we lack panel data which would cast more light on these issues.

It proved difficult to find clear indications of the role different types of training play in eradicating skill mismatch. But, while we could find no evidence that skill mismatch was lower where HPWPs were present, such practices are associated with higher earnings and higher job satisfaction and, therefore, may play an important role in raising the overall wellbeing of the workforce by compensating for the ill effects of mismatch.

What does all this mean for ageing workers? First, though ageing workers are less subject to overskilling than prime age workers, its level is still substantial and requires appropriate action. Also, the more well-educated ageing workers are most prone to overskilling, increasing the opportunity cost of underusage. Second, ageing workers are more optimistic than their younger colleagues about the likelihood of working beyond the age of 60, particularly if they are working part-time, and this may suggest that increasing the availability of part-time bridge

jobs could be helpful in extending the working life of some ageing workers. While the potential payback period from such an investment may be shorter than for younger workers, the actual difference may not be as large as implied because of the greater job mobility of younger workers.

As the working population ages it will become even more necessary to make full use of the older segment of the population. Employers play a crucial role in matching the skills of their workers to jobs, but effective use of skills requires detailed information on matching at enterprise level. We recommend, therefore, that employers review the incidence of skill mismatch among their employees, and where it is substantial and above a critical level, take appropriate action. This may require employers to review the skill needs of their employees, perhaps by conducting surveys of their employees to ascertain their views on how well their skills are used, along the lines of the job-satisfaction surveys commonly administered in many large organisations.

References

Aubert, P. et al. (2006). New technologies, organisation and age: firm level evidence. *Economic journal*, Vol. 116, No 509, p. F73-F93.

BIS (2009). *Skills for Growth: the national skills strategy.* London: TSO.

Bosma, H. et al. (2003). Education and age related cognitive decline: the contribution of mental workload. *Educational gerontology*, Vol. 29, No 2, p. 165-173.

Cedefop (2009). *Skill mismatch; identifying priorities for future research: Cedefop research arena (Cedra).* Thessaloniki: Cedefop (Working paper No 3).

Cedefop (2010). *The skill matching challenge; analysing skill mismatch and policy Implications*. Luxembourg: Publications Office, 2010.

Cottini, E.; Lucifora, C. (2010). *Mental health and working conditions in European countries.* Bonn: IZA (IZA Discussion paper No 4717).

De Grip, A. et al. (2009). Are more competent workers more satisfied? *Labour*, Vol. 23, No 4, p. 589-607.

Dolton, P. et al. (2007). Use it or lose it? The impact of computers on earnings. *Manchester school*, Vol. 75, No 6, p. 673-694.

Eurofound (2008). *Working conditions of an ageing workforce*. Luxembourg: Publications Office.

Eurofound (2009). *Drawing on experience: older women workers in Europe*. Dublin: Eurofound (Foundation findings).

European Commission (2005). *Communication from the Commission: green paper 'confronting demographic change: a new solidarity between the generations, employment and social affairs'.* Luxembourg: Publications Office (COM(2005) 94 final).

European Commission (2007). *Europe's demographic future: facts and figures on challenges and opportunities*. Luxembourg: Publications Office.

European Commission (2009). *Demographic report 2008: meeting social needs in an ageing society.* Commission staff working document. Luxembourg: Publications Office.

European Commission (2010a). *New skills for new jobs: action now. A report by the expert group on new skills for new jobs*. Brussels: European Commission.

European Commission (2010b). *Communication from the Commission: Europe 2020: a strategy for smart, sustainable and inclusive growth*. Luxembourg: Publications Office (COM(2010) 2020).

Friedberg, L. (2003). The impact of technological change on older workers; evidence from data on computer use. *Industrial and labor relations review*, Vol. 56, No 3, p. 511-529.

Hutchens, R. (1986). Delayed payment contracts and a firms propensity to hire older workers. *Journal of labor economics*, Vol. 4, No 4, p. 439-457.

Janssen, S.; Backes-Gellner, U. (2009). Skill obsolescence, vintage effects and changing tasks. *Applied economics quarterly*, Vol. 55, No 1,p. 83-103.

McGuinness, S.; Wooden, M. (2009). Overskilling, job insecurity and career mobility. *Industrial relations*, Vol. 48, No 2, 265-286.

Neuman, S.; Weiss, A. (1995). On the effects of schooling vintage on experience-earnings profiles: theory and evidence. *European economic review*, Vol. 39, No 5, p. 943-955.

Rubb, S. (2009). Overeducation among older workers: impact on wages and early retirement decisions. *Applied economics letters*, Vol. 16, No 16, p. 1621-1626.

Ruhm, C. (1990). Bridge jobs and partial retirement. *Journal of labor economics*, Vol. 8, p. 482-501.

Scottish Government. *Skills for Scotland*, 2007.

Weber, S. (2010). *Human capital depreciation and education level: some evidence for Switzerland.* University of Geneva (Working paper series).

ANNEX 1

Variable definitions

Variable	Variable description
lnmonthpay	The natural logarithm of net monthly income from main paid job. Represented as the minimum and maximum around 10 reported income bands in constant 2005 euro prices.
male	Dummy variable indicating that the respondent is male.
exper	Number of years in paid employment since respondent left full-time education. Entered in linear and quadratic (exper2) form.
age	Set of dummy variables denoting respondent's age. age1529: between 15 and 29 years inclusive; age3049: between 30 and 49 years inclusive; age50p: more than 49 years old.
tenure	Number of years respondent has been working with current employer. Entered in linear and quadratic (tenure2) form.
education	Set of dummy variables denoting the respondent's highest educational qualification level or training completed. noqual: no education primary: primary education (ISCED 1); lowsec: lower secondary education (ISCED 2); upsec: upper secondary education (ISCED 3); postsec: post-secondary (non-tertiary) education (ISCED 4); degree: tertiary education – first level (ISCED 5); postgrad: tertiary education – advanced level (ISCED 6).
emptrain	Number of days of employer-funded training received by respondent in previous year. Entered in linear and quadratic (emptrain2) form.
owntrain	Number of days of own-funded training received by respondent in previous year. Entered in linear and quadratic (owntrain2) form.
onjobtrain	Dummy variable denoting that the respondent has received on-the-job training in previous year.
otheronsite	Dummy variable denoting that the respondent has received other forms of onsite training in the previous year.
othertrain	Dummy variable denoting that the respondent has received other training in the previous year.
perm	Dummy variable denoting that the respondent has a permanent employment contract.
hours	Number of hours usually worked per week in main paid job.
parttime	Dummy variable denoting that the respondent works on a part-time basis.
supervise	Dummy variable denoting that the respondent supervises others at work.
size	Set of dummy variables denoting the size of establishment the respondent works in. size19: between one and nine employees inclusive; size1049: between 10 and 49 employees inclusive; size5099: between 50 and 99 employees inclusive; size100249: between 100 and 249 employees inclusive; size250499: between 250 and 499 employees inclusive; size500: 500 or more employees.
public	Dummy variable denoting that the respondent works in the public sector (self-reported).
fearjobloss	Dummy variable denoting that the respondent agrees or strongly agrees that he/she might lose job in the next six months.
fewerhours	Dummy variable denoting that the respondent would like to work fewer hours.
health	Set of dummy variables denoting the health status of the respondent. health1: no reported health problems; health2: reported health problem but has not caused absence from work in previous year; health3: reported health problem that has caused absence from work in previous year.
sickleave	Number of days absent from work in previous year due to ill health. Entered in linear and quadratic (sickleave2) form.
satisfied	Dummy variable denoting that the respondent is satisfied or very satisfied with working conditions in main paid job.
nights	Dummy variable denoting that the respondent works for at least two hours each month between 10.00pm and 5.00am.
eveningw	Dummy variable denoting that the respondent works for at least two hours each month between 6.00pm and 10.00pm.
weekend	Dummy variable denoting that the respondent works at least one day each month on a Saturday or Sunday.
shift	Dummy variable denoting that the respondent works shifts.
famfriend	Dummy variable denoting that the respondent's working hours fit very well with family or social commitments.
jobspeed	Dummy variable denoting that the respondent's job involves working at very high speed (almost) all of the time.
jobdeadline	Dummy variable denoting that the respondent's job involves working to tight deadlines (almost) all of the time.

Variable	Variable description
workit	Dummy variable denoting that the respondent's job involves working with computers at least three-quarters of the time.
physicdemand	Dummy variable denoting that the respondent's job involves lifting or moving people, carrying or moving heavy loads, or standing or walking at least three-quarters of the time.
jobqualstand	Dummy variable denoting that the respondent's job involves meeting precise quality standards.
jobselfassess	Dummy variable denoting that the respondent's job involves quality self-assessment.
jobprobsolve	Dummy variable denoting that the respondent's job involves solving unforeseen problems alone.
jobmonot	Dummy variable denoting that the respondent's job involves monotonous tasks.
jobcomplex	Dummy variable denoting that the respondent's job involves complex tasks.
joblearning	Dummy variable denoting that the respondent's job involves learning new things.
autonmethod	Dummy variable denoting that the respondent is able to choose or change his/her methods of work.
consult	Dummy variable denoting that the respondent has been consulted about changes in the organisation of work and/or his/her working conditions.
regassess	Dummy variable denoting that the respondent has been subject to regular formal assessment of his/her work performance.
careerpros	Dummy variable denoting that the respondent agrees or strongly agrees that his/her job offers good prospects for career advancement.
profshare	Dummy variable denoting that the respondent's remuneration includes payments based on the overall performance of the company worked for.
compshare	Dummy variable denoting that the respondent's remuneration includes income from shares in the company worked for.
perfpay	Dummy variable denoting that the respondent's remuneration includes payments based on the overall performance of a group.
selfmanagedteam	Dummy variable denoting that the respondent's job involves working as part of a team whose members decide upon the division of tasks themselves.
disamen_1	Dummy variable denoting that the respondent's job exposes them to vibrations from hand tools, machinery etc. at least three-quarters of the time.
disamen_2	Dummy variable denoting that the respondent's job exposes them to noise so loud that he/she would have to raise his/her voice to talk to people at least three-quarters of the time.
disamen_3	Dummy variable denoting that the respondent's job exposes them to high temperatures which make him/her perspire even when not working at least three-quarters of the time.
disamen_4	Dummy variable denoting that the respondent's job exposes them to low temperatures whether indoors or outdoors at least three-quarters of the time.
disamen_5	Dummy variable denoting that the respondent's job exposes them to breathing in smoke, fumes, powder or dust etc. at least three-quarters of the time.
disamen_6	Dummy variable denoting that the respondent's job exposes them to breathing in vapours such as solvents or thinners at least three-quarters of the time.
disamen_7	Dummy variable denoting that the respondent's job exposes them to handling or being in skin contact with chemical products or substances at least three-quarters of the time.
disamen_8	Dummy variable denoting that the respondent's job exposes them to radiation at least three-quarters of the time.
disamen_9	Dummy variable denoting that the respondent's job exposes them to tobacco smoke from other people at least three-quarters of the time.
disamen_10	Dummy variable denoting that the respondent's job exposes them to handling or being in direct contact with infectious material at least three-quarters of the time.
disamen_11	Dummy variable denoting that the respondent's job involves tiring or painful positions at least three-quarters of the time.
amen_1	Dummy variable denoting that the respondent can at least sometimes get assistance from colleagues.
amen_2	Dummy variable denoting that the respondent can at least sometimes get assistance from boss/superiors.
amen_3	Dummy variable denoting that the respondent can at least sometimes get external assistance.
amen_4	Dummy variable denoting that the respondent can at least sometimes influence choice of working partners.
amen_5	Dummy variable denoting that the respondent can at least sometimes take a break when he/she wishes.
amen_6	Dummy variable denoting that the respondent does at least sometimes have enough time to get the job done.
amen_7	Dummy variable denoting that the respondent can at least sometimes decide when to take holidays or days off.

Variable	Variable description
amen_8	Dummy variable denoting that the respondent can at least sometimes have the opportunity to do what he/she does best.
amen_9	Dummy variable denoting that the respondent's job gives him/her the feeling of work well done at least sometimes.
amen_10	Dummy variable denoting that the respondent is able to apply own ideas in his/her work at least sometimes.
amen_11	Dummy variable denoting that the respondent has the feeling of doing useful work at least sometimes.
amen_12	Dummy variable denoting that the respondent finds job intellectually demanding at least sometimes.
grp1_factorx	Factor analysis grouping based on the variables nights, eveningw, weekend, shift and famfriend. x=1.
grp2_factorx	Factor analysis grouping based on the variables jobspeed, jobdeadline, workit and physicdemand. x=1,2.
grp3_factorx	Factor analysis grouping based on the variables jobqualstand, jobselfassess, jobprobsolve, jobmonot, jobcomplex, joblearning and autonmethod. x=1,2.
grp4_factorx	Factor analysis grouping based on the variables consult, regassess, careerpros, profshare, compshare, perfpay and selfmanagedteam. x=1,2.
grp5_factorx	Factor analysis grouping based on the variables disamen_1-disamen_11. x=1,2.
grp6_factorx	Factor analysis grouping based on the variables amen_1-amen_12. x=1...4.
grp7_factorx	Factor analysis grouping based on the variables consult, regassess, profshare, compshare, perfpay and selfmanagedteam. x=1,2.
nojobat60	Dummy variable denoting that the respondent does not think that he/she will be able to do the same job at 60 years of age, assuming that the job is not physically demanding nor involves handling infectious material.
underskill	Dummy variable denoting that the respondent needs further training to cope well with the duties in his/her job.
overskill	Dummy variable denoting that the respondent has the skills to cope with more demanding duties.
matchskill	Dummy variable denoting that the respondent's duties correspond well with his/her present skills.
undered	Dummy variable denoting that the respondent's education level is below the average in his/her occupation.
overed	Dummy variable denoting that the respondent's education level is above the average in his/her occupation.
matched	Dummy variable denoting that the respondent's education level matches the average in his/her occupation.
overedonly	Dummy variable denoting that the respondent is over-educated (overed) but under-skilled (underskill) or matched in skill (matchskill).
overskonly	Dummy variable denoting that the respondent is over-skilled (overskill) but under-educated (undered) or matched in education (matched).
bothover	Dummy variable denoting that the respondent is over-educated (overed) and over-skilled (overskill).
underedonly	Dummy variable denoting that the respondent is under-educated (undered) but over-skilled (overskill) or matched in skill (matchskill).
underskonly	Dummy variable denoting that the respondent is under-skilled (underskill) but over-educated (overed) or matched in education (matched).
bothunder	Dummy variable denoting that the respondent is under-educated (undered) and under-skilled (underskill).
bothmatch	Dummy variable denoting that the respondent is matched in education (matched) and skill (skillmatch).

ANNEX 2
Details of factor analysis

Factor analysis finds few common factors that linearly reconstruct a set of identified variables. In the analysis conducted in this report, seven variable groupings are used to identify a set of factors. These groupings are:

Group 1: flexibility of work,
Group 2: miscellaneous aspects of job,
Group 3: nature of work,
Group 4: high performance workplace practices,
Group 5: disamenities of job,
Group 6: amenities of job,
Group 7: high performance workplace practices (excluding career prospects).

For each grouping, a principal-component factor analysis determined the number of vectors to be retained. In all cases, this was taken to be those factors with an Eigen value greater than 1. As is standard practice, the factor loadings implied by these retained vectors were rotated and new common factors predicted from these rotated factors. The scoring coefficients used in creating the new common factors are shown below.

Group 1:
nights eveningw weekend shift famfriend

Factor	Eigenvalue	Proportion	Cumulative
Factor1	2.299	0.460	0.460
Factor2	0.917	0.183	0.643
Factor3	0.695	0.139	0.782
Factor4	0.583	0.117	0.899
Factor5	0.505	0.101	1.000

Number of observations = 24 427

Scoring coefficients (based on rotated factors)

Variable	Factor1
nights	0.329
eveningw	0.335
weekend	0.308
shift	0.300
famfriend	-0.171

Group 2:
jobspeed jobdeadline workit physicdemand

Factor	Eigenvalue	Proportion	Cumulative
Factor1	1.583	0.396	0.396
Factor2	1.367	0.342	0.738
Factor3	0.607	0.152	0.889
Factor4	0.443	0.111	1.000

Number of observations = 24 427

Scoring coefficients (based on rotated factors)

Variable	Factor1	Factor2
jobspeed	0.560	0.024
jobdeadline	0.564	-0.049
workit	0.074	-0.606
physicdemand	0.053	0.594

Group 3:
jobqualstand jobselfassess jobprobsolve jobmonot jobcomplex joblearning autonmethod

Factor	Eigenvalue	Proportion	Cumulative
Factor1	2.142	0.306	0.306
Factor2	1.160	0.166	0.472
Factor3	0.883	0.126	0.598
Factor4	0.865	0.124	0.721
Factor5	0.708	0.101	0.823
Factor6	0.664	0.095	0.917
Factor7	0.579	0.083	1.000

Number of observations = 24 427

Scoring coefficients (based on rotated factors)

Variable	Factor1	Factor2
jobqualstand	0.156	0.562
jobselfassess	0.262	0.268
jobprobsolve	0.306	-0.045
jobmonot	-0.123	0.564
jobcomplex	0.304	0.041
joblearning	0.335	-0.035
autonmethod	0.249	-0.388

Group 4:
consult regassess careerpros profshare compshare perfpay selfmanagedteam

Factor	Eigenvalue	Proportion	Cumulative
Factor1	1.703	0.243	0.243
Factor2	1.265	0.181	0.424
Factor3	0.936	0.134	0.558
Factor4	0.911	0.130	0.688
Factor5	0.859	0.123	0.811
Factor6	0.688	0.098	0.909
Factor7	0.637	0.091	1.000

Number of observations = 24 427

Scoring coefficients (based on rotated factors)

Variable	Factor1	Factor2
consult	-0.047	0.512
regassess	-0.028	0.496
careerpros	0.048	0.299
profshare	0.512	-0.029
compshare	0.395	-0.064
perfpay	0.499	-0.039
selfmanagedteam	-0.055	0.314

Group 5:
disamen_1-disamen_11

Factor	Eigenvalue	Proportion	Cumulative
Factor1	3.173	0.289	0.289
Factor2	1.293	0.118	0.406
Factor3	0.945	0.086	0.492
Factor4	0.924	0.084	0.576
Factor5	0.903	0.082	0.658
Factor6	0.859	0.078	0.736
Factor7	0.749	0.068	0.804
Factor8	0.617	0.056	0.860
Factor9	0.588	0.054	0.914
Factor10	0.476	0.043	0.957
Factor11	0.473	0.043	1.000

Number of observations = 24 427

Scoring coefficients (based on rotated factors)

Variable	Factor1	Factor2
disamen_1	0.303	-0.092
disamen_2	0.303	-0.085
disamen_3	0.264	-0.062
disamen_4	0.265	-0.118
disamen_5	0.212	0.072
disamen_6	-0.027	0.389
disamen_7	-0.102	0.466
disamen_8	-0.031	0.223
disamen_9	0.110	0.054
disamen_10	-0.174	0.418
disamen_11	0.168	0.048

Group 6:
amen_1-amen_12

Factor	Eigenvalue	Proportion	Cumulative
Factor1	2.839	0.237	0.237
Factor2	1.338	0.112	0.348
Factor3	1.250	0.104	0.452
Factor4	1.129	0.094	0.546
Factor5	0.833	0.069	0.616
Factor6	0.752	0.063	0.678
Factor7	0.738	0.062	0.740
Factor8	0.730	0.061	0.801
Factor9	0.679	0.057	0.857
Factor10	0.631	0.053	0.910
Factor11	0.566	0.047	0.957
Factor12	0.515	0.043	1.000

Number of observations = 24 427

Scoring coefficients (based on rotated factors)

Variable	Factor1	Factor2	Factor3	Factor4
amen_1	-0.060	0.533	-0.109	-0.060
amen_2	-0.054	0.531	-0.065	-0.087
amen_3	-0.088	0.276	0.113	0.260
amen_4	-0.080	0.022	0.264	0.403
amen_5	-0.075	-0.118	0.543	-0.040
amen_6	0.086	0.109	0.181	-0.607
amen_7	-0.070	-0.008	0.478	-0.161
amen_8	0.255	-0.037	0.100	-0.044
amen_9	0.408	-0.041	-0.089	-0.137
amen_10	0.238	-0.049	0.076	0.217
amen_11	0.413	-0.050	-0.133	-0.080
amen_12	0.214	-0.003	-0.097	0.385

Group 7:
consult regassess profshare compshare perfpay selfmanagedteam

Factor	Eigenvalue	Proportion	Cumulative
Factor1	1.633	0.272	0.272
Factor2	1.245	0.208	0.480
Factor3	0.936	0.156	0.636
Factor4	0.859	0.143	0.779
Factor5	0.689	0.115	0.894
Factor6	0.637	s	1.000

Number of observations = 24 427

Scoring coefficients (based on rotated factors)

Variable	Factor1	Factor2
consult	-0.036	0.567
regassess	-0.017	0.542
profshare	0.515	-0.018
compshare	0.396	-0.058
perfpay	0.501	-0.023
selfmanagedteam	-0.048	0.346

ANNEX 3

EWCS 2005 detailed occupational distribution percentages by mismatch category

	Cases	Overeducated only	Overskilled only	Overeducated and overskilled	Undereducated only	Underskilled only	Undereducated and underskilled	Matched
Armed forces	174	14.52	28.20	4.03	7.49	16.68	0.33	33.55
Legislators and senior officials	106	34.27	8.06	20.08	9.33	18.35	0.25	24.59
Corporate managers	474	23.87	21.96	20.24	5.16	11.56	0.64	23.70
Managers of small enterprises	508	10.84	32.08	6.52	15.86	12.41	2.66	29.73
Physical, mathematical and engineering	489	2.72	34.44	2.05	14.35	21.70	3.60	29.32
Life science and health professionals	574	6.41	23.54	4.79	13.51	17.58	6.74	32.54
Teaching professionals	1 487	4.44	24.84	1.77	7.84	20.42	1.57	42.10
Other professionals	966	7.14	31.63	3.36	17.82	14.22	4.01	29.90
Physical and engineering science associated	603	11.56	27.39	4.28	16.34	17.50	4.33	31.90
Life science and health associate professionals	849	5.79	21.95	4.63	17.88	16.68	3.88	36.62
Teaching associate professionals	652	17.01	24.50	9.35	12.79	15.36	3.84	29.29
Other associate professionals	1 682	11.30	26.81	7.12	16.75	12.06	3.10	34.97
Office clerks	2 481	14.42	25.29	8.87	6.21	14.12	0.73	36.67
Customer services clerks	1 001	7.10	30.89	5.77	14.07	9.39	2.46	36.75
Personal and protective services workers	1 833	11.53	27.77	8.69	13.22	10.40	1.29	34.54
Models, salespersons and demonstrators	1 224	7.90	29.00	7.22	11.67	7.02	1.27	40.79
Skilled agricultural and fishery workers	197	4.92	33.43	1.04	4.26	3.34	2.94	50.98
Extraction and building trades workers	941	7.28	29.77	2.03	8.44	10.93	1.09	45.16
Metal, machinery and related trades workers	1 049	5.77	28.04	3.73	3.29	17.11	0.31	45.00
Precision, handicraft, craft printing and related	334	13.24	18.10	7.72	4.47	18.20	1.67	47.37
Other craft and related trades workers	846	4.59	36.19	3.00	7.80	7.14	0.33	45.31
Stationary plant and related operators	359	4.47	25.34	2.15	5.72	8.21	1.57	55.41
Machine operators and assemblers	657	5.94	32.78	4.16	12.39	7.95	0.15	42.91
Drivers and mobile plant operators	898	3.13	31.16	4.98	9.82	7.17	0.06	47.75
Sales and services elementary occupations	2 412	6.43	32.60	7.21	10.90	4.33	0.34	41.88
Agricultural, fishery and related labourers	234	4.02	35.68	10.20	18.40	5.74	1.39	32.03
Labourers in mining, construction, manufacturing.	804	4.18	35.50	3.77	11.31	7.64	0.27	42.35
Not stated	122	16.91	31.57	4.64	16.12	5.20	0.96	31.77
All occupations	23 956	8.72	28.75	6.00	11.10	11.75	1.68	38.45

ANNEX 4

EWCS 2005 detailed industrial distribution percentages by mismatch category

	Cases	Over-educated only	Overskilled only	Overe-ducated and overskilled	Under-educated only	Underskilled only	Under-educated and underskilled	Matched
Agriculture, hunting and related service activities	416	6.05	37.27	7.00	14.59	6.60	0.85	32.60
Forestry, logging and related service activities	105	1.36	16.86	6.22	8.70	11.11	0.00	57.17
Fishing, fish farming and related service activities	27	14.63	12.00	0.95	6.33	0.38	24.70	41.62
Mining of coal and lignite; extraction of peatw	50	1.94	19.74	2.21	16.33	6.24	0.00	57.97
Extraction of crude petroleum etc.	42	19.95	13.58	22.31	7.72	10.96	4.53	22.80
Mining of metal, uranium and thorium ores	13	3.82	20.38	0.00	1.46	0.00	0.00	74.34
Other mining and quarrying	43	15.66	17.89	1.58	32.41	16.00	0.00	23.96
Manufacture of food products and beverages	640	3.56	35.26	2.80	14.52	8.54	0.79	41.80
Manufacture of tobacco products	13	5.00	65.91	25.94	0.37	0.00	0.00	2.77
Manufacture of textiles	232	8.07	37.93	2.98	13.46	8.15	0.81	36.06
Manufacture of wearing apparel etc.	359	5.92	33.61	6.33	7.21	7.04	0.45	46.91
Tanning and dressing of leather; manufacture of leather products	73	0.00	42.06	4.57	3.81	13.31	0.00	36.95
Manufacture of wood products etc.	201	0.53	24.68	3.14	21.71	8.78	1.29	50.36
Manufacture of pulp, paper and paper products	97	2.89	32.37	5.59	6.81	10.02	0.24	45.35
Publishing, printing etc.	217	10.91	21.97	8.09	8.40	9.79	0.47	44.79
Manufacture of coke, refined petroleum and nuclear products	41	6.00	37.64	0.67	9.89	9.71	9.76	30.54
Manufacture of chemicals and chemical products	211	12.51	23.78	10.91	11.67	13.71	1.63	30.96
Manufacture of rubber and plastic products	168	9.11	44.34	2.45	11.72	10.91	0.22	32.10
Manufacture of other non-metallic minerals	139	6.18	33.39	4.01	4.19	14.80	0.02	44.40
Manufacture of basic metals	183	4.49	33.39	0.75	1.43	3.98	2.87	59.89
Manufacture of fabricated metal products	306	4.75	27.20	2.46	5.10	15.29	0.47	47.48
Manufacture of machinery and equipment nec	327	10.09	29.81	4.92	6.70	10.94	0.73	34.36
Manufacture of office machinery etc.	39	20.42	33.79	15.51	3.46	13.64	0.00	46.55
Manufacture of electrical machinery and apparatus nec	187	6.82	15.84	7.14	9.00	21.27	0.20	36.08
Manufacture of radio, television etc.	84	2.37	23.12	10.23	5.19	19.95	11.12	42.04
Manufacture of medical, precision and other related products	71	16.93	11.11	1.99	14.93	8.04	1.35	39.57
Manufacture of motor vehicles and (semi-) trailers	175	6.13	22.41	6.54	9.50	14.09	2.26	36.58
Manufacture of other transport equipment	73	2.46	29.60	2.04	22.14	9.82	0.64	42.14

	Cases	Over-educated only	Overskilled only	Overe-ducated and overskilled	Under-educated only	Underskilled only	Under-educated and underskilled	Matched
Manufacture of furniture; manufacturing nec	268	9.86	37.30	6.44	7.94	14.44	0.33	40.69
Recycling	24	2.15	44.35	0.00	6.19	0.77	4.94	45.65
Electricity, gas, steam and hot water	364	9.10	27.22	7.16	6.34	16.06	0.59	38.72
Collection, purification and distribution of water	77	10.50	33.30	6.16	6.39	3.49	9.77	35.01
Construction	1 473	5.14	28.60	1.96	10.16	13.30	1.80	45.16
Sale, maintenance and repair of motor vehicles	435	8.02	29.03	5.11	11.04	19.60	1.63	32.61
Wholesale trade and commission trade etc.	529	9.64	27.45	5.82	14.81	9.19	1.07	40.57
Retail trade, except of motor vehicles	2 135	5.98	34.05	5.22	10.49	7.34	0.74	41.26
Hotels and restaurants	908	6.55	33.23	5.39	18.22	5.90	1.48	36.03
Land transport; transport via pipelines	670	5.11	29.52	3.64	7.86	9.33	0.55	47.63
Water transport	78	18.53	42.81	2.07	8.65	20.01	0.00	25.12
Air transport	117	12.64	32.39	15.92	6.52	19.32	0.37	17.34
Supporting and auxiliary transport activities	224	11.23	31.16	11.08	8.31	4.53	6.11	32.16
Post and telecommunications	455	8.18	31.26	9.31	14.50	7.33	0.90	33.87
Financial intermediation, except insurance and pension	462	10.21	20.57	13.12	12.79	10.36	0.98	38.13
Insurance and pension funding	242	12.86	23.55	6.60	5.93	11.92	5.55	38.60
Activities auxiliary to financial intermediation	151	15.74	26.64	10.33	6.37	11.42	3.55	33.72
Real estate activities	146	13.44	24.69	5.17	13.06	16.71	0.08	45.33
Renting of machinery and equipment without operator	23	6.63	34.55	11.75	2.61	0.13	0.00	44.34
Computer and related activities	261	18.52	25.38	15.12	4.95	15.20	1.67	25.69
Research and development	182	20.67	20.13	16.21	7.76	12.00	1.05	26.05
Other business activities	919	8.51	31.79	5.87	13.53	8.17	1.49	37.38
Public administration and defence	1 887	16.37	22.70	9.09	10.65	14.99	1.08	34.56
Education	2 607	10.10	25.32	5.00	7.65	17.88	2.00	37.63
Health and social work	2 601	9.08	23.40	5.80	12.80	15.08	4.28	36.12
Sewage and refuse disposal, sanitation and similar	161	13.57	27.79	0.73	15.49	3.35	2.16	44.07
Activities of membership organizations nec	152	17.10	27.29	12.19	6.82	9.18	1.82	30.29
Recreational, cultural and sporting activities	418	8.72	35.63	9.93	18.61	10.75	1.84	26.89
Other service activities	1 003	5.76	27.38	4.70	12.58	13.29	2.41	39.80
Activities of households as employers of domestic staff	133	4.41	31.77	2.44	33.59	0.86	0.00	33.12
Undifferentiated goods producing activities of private households	21	3.16	42.56	19.12	36.01	0.85	0.00	19.58
Undifferentiated services producing activities of private households	20	14.78	67.05	1.60	56.47	0.00	0.00	6.83
Extra-territorial organizations and bodies	30	35.09	22.97	17.48	16.82	0.63	0.00	23.65
Not stated	248	10.85	34.75	3.10	17.02	7.35	0.06	37.89
All industries	23 956	8.72	28.75	6.00	11.10	11.75	1.68	38.45

ANNEX 5
Details of cluster analysis

Cluster analysis is the name given to techniques that seek to uncover groups or clusters within data. The most commonly used class of clustering techniques contain methods that lead to hierarchical classifications of observations, starting at the stage where each observation is regarded as forming its own unique cluster and finishing at the stage where all observations are in a single group. Central to these approaches is the need to measure the 'distance' between observations, which in turn defines their similarity or dissimilarity. The precise measure adopted in this report is to rely upon median-link clustering, which uses the median similarity (or dissimilarity) of observations between groups as the relevant distance measure. Similarity (dissimilarity) is defined in terms of country-specific average rates of overskilling, underskilling, overeducation and undereducation. The Calinski/Harabasz pseudo-F statistic suggests that the optimal number of clusters contained within the data is two. These two clusters contain the following countries:

Cluster 1 Austria, Belgium, Bulgaria, Czech Republic, Denmark, Estonia, Finland, Germany, Italy, Lithuania, Latvia, Malta, Netherlands, Norway, Poland, Portugal, Slovenia, Slovakia, Switzerland;

Cluster 2 Croatia, Cyprus, France, Greece, Hungary, Ireland, Luxembourg, Romania, Spain, Sweden, Turkey, UK.

Cluster 1 was a relatively highly matched group, with 44.24 % of respondents matched for both education and skills, though still a few respondents fell into this category (Table 18). In the second cluster only 32.06 % of respondents were well matched. This split emphasises the point that mismatch is a widespread phenomenon and differences across countries are a matter of degree. The main driver of the adopted clusters appears to be overskilling, which affects 24.42% of the sample in Cluster 1 and 33.54 % in Cluster 2. The corresponding figures for overeducation only are 8.27 % and 9.21 % respectively, for those who are both overskilled and overeducated 3.60 and 8.64 %, and for undereducated only 7.91 and 14.61 %. There is a higher proportion of underskilled only in the relatively more matched Cluster 1 – 14.79 % as opposed to 8.38 %, perhaps emphasising that this is not necessarily an undesirable state.

The clusters are derived from mean values of the mismatch variables, but equations were estimated based on individual observations (for reasons of space we do not report the detailed results). This explains why, although certain countries fall naturally into one cluster or the other, some country dummies remain significantly different from the coefficient on the excluded country. We are particularly interested in whether the key explanatory variables behave differently

in each of the clusters. The overwhelming impression is that it is not the case. However, there are some exceptions. Thus, there are some gender differences with men significantly more likely to be overskilled than women in Cluster 2, but not so in Cluster 1. For undereducation, males are more likely to be undereducated than women in Cluster 1, while the reverse happen in Cluster 2. There are gender differences across clusters in some of the other regressions. Type of employment contract also sometimes have different effects across clusters. Thus, permanent workers are less likely to be underskilled in Cluster 1, but not significantly in Cluster 2. Similarly, part-time workers are more likely to be overeducated in Cluster 1, than in Cluster 2. In the earnings equations for ageing workers, the mismatch variables have stronger earnings effects in Cluster 2 than in Cluster 1, with overskilled only significant and positive in Cluster 1, whereas negatively signed in Cluster 2. Underskilled only was positive and significant in Cluster 2 and insignificant in Cluster 1. Finally, in the job satisfaction equations men have significantly lower job satisfaction than women only in Cluster 2. There are no simple explanations for such differences.

The division into two clusters is not a natural one as diverse countries are found in each group and similar countries such as Spain and Portugal appear in different clusters, which makes interpretation far from straightforward.

Table 18. **EWCS 2005 education and skill mismatch percentages by cluster grouping**

	Cluster group 1	Cluster group 2	EU-15 average
Cases	15 136	8 820	23 956
Overeducated only	8.27	9.21	8.72
Overskilled only	24.42	33.54	28.75
Overeducated and overskilled	3.60	8.64	6.00
Undereducated only	7.91	14.61	11.10
Underskilled only	14.79	8.38	11.75
Undereducated and underskilled	1.81	1.54	1.68
Matched	44.24	32.06	38.45

NB: all percentages are calculated using cross-national weighted data (w5_ewcs).

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The right skills for silver workers

An empirical analysis

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The right skills for silver workers

An empirical analysis

TI-BC-10-007-EN-N

This research paper deals with skill mismatch among ageing workers. Not only is population ageing a dominant trend in the EU, but ageing workers are one of the groups particularly affected by skill mismatch. The paper features detailed empirical analyses of the impacts of skill mismatch on ageing workers and compares them with younger and prime-age workers. It discusses the determinants of different types of mismatch and provides a comprehensive analysis of its impacts on wages, job satisfaction, career and employment prospects and health. The results clearly indicate the need to take skill mismatch seriously and improve the use of skills in the workplace. It also highlights the role workplace conditions can play in better matching skills and jobs.

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