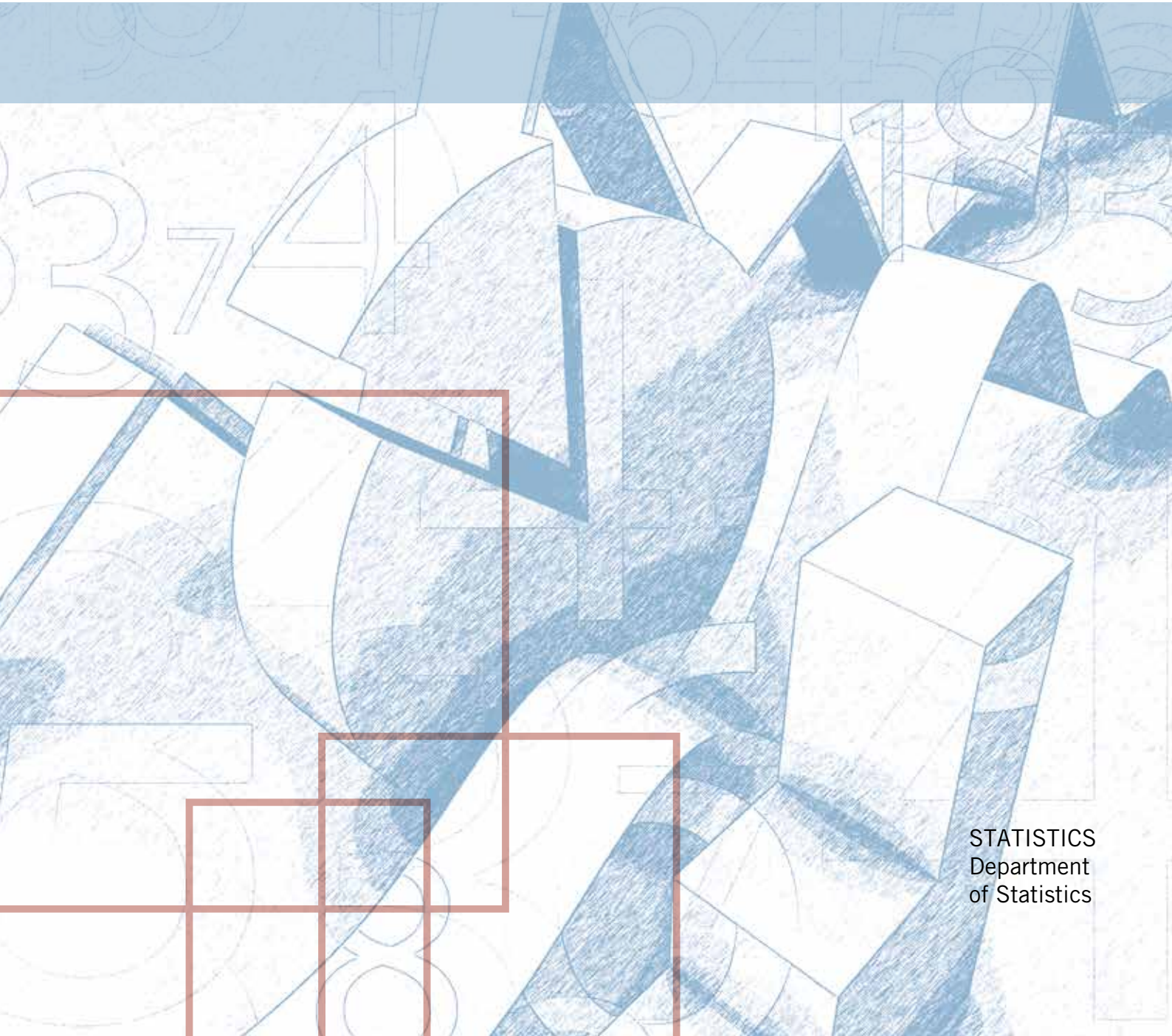




International
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Geneva

Skills mismatch in Europe



STATISTICS
Department
of Statistics

International Labour Organization

Skills mismatch in Europe

Statistics Brief

Geneva, 2014

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Preface

In 2008, the 18th International Conference of Labour Statisticians (ICLS) discussed the use of skills mismatch as a potential indicator or component of the measurement of labour underutilization, and this component was also explicitly taken into account in the Resolution concerning statistics of work, employment and labour underutilization adopted by the 19th ICLS in 2013. In the Resolution concerning the development of measures of labour underutilization the 18th ICLS also recommended that the ILO work on the development of a methodology for the measurement of skills mismatch. Although various approaches are currently used by researchers, an agreed methodology is lacking.

This brief is part of the efforts that the ILO Department of Statistics is undertaking to contribute to the statistical understanding and quantification of skills mismatch. The brief provides an overview of approaches to measure skills mismatch, and illustrates two approaches using data from the European Social Survey (ESS). Despite some of the limitations for this purpose of current international classifications and of the ESS as a data source, the paper shows that it is possible to produce useful indicators and illustrate major trends.

The paper builds on earlier work undertaken by the ILO on this topic, including the work reported in the Key Indicators of the Labour Market, 8th edition (2013). I would like to express my appreciation for the European Social Survey project which provided the statistics used in the current document. Theo Sparreboom and Alexander Tarvid prepared the draft paper, which benefited from comments provided by David Hunter and Mustafa Hakki Ozel.

Rafael Diez de Medina, Director
ILO Department of Statistics

Abstract

This Statistics Brief analyzes the incidence of overeducation and undereducation (skills mismatch) in a sample of European economies. Mismatch patterns are shown to depend strongly on the measure of mismatch that is adopted, but overeducation is increasing and undereducation is decreasing on at least one measure in at least half of the countries for which such trends can be assessed. Differences in skills mismatch risk between age groups and sexes are discussed, and country-specific trends are identified.

1. Introduction

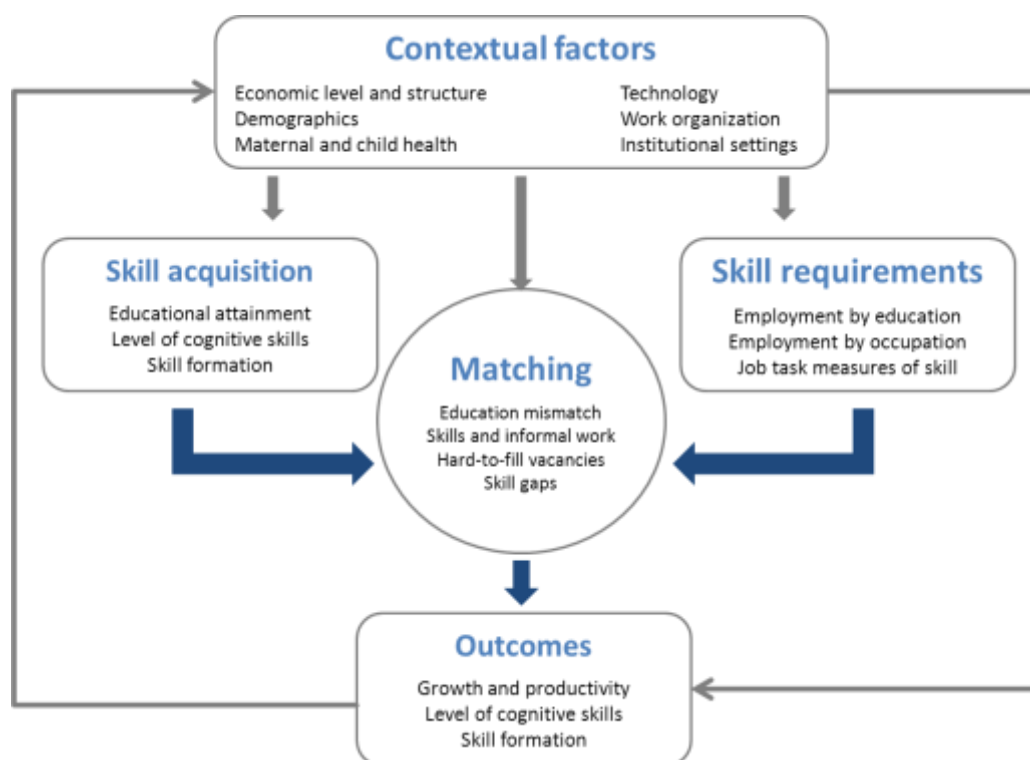
Skills mismatch has received renewed attention in advanced economies following the global economic crisis in 2008-2009. The crisis caused a massive increase in unemployment in the developed world, and patterns of job destruction and job creation interacted with or accelerated longer term structural trends. At the supply side, such trends include increasing levels of educational attainment of workers, while major factors at the demand side include technological change, globalization and trade. Many analysts have argued that skills mismatch has been reinforced by the economic crisis, and identified skills mismatch as a major constraint hampering economic recovery in Europe (ECB, 2012).

If growth of educated supply outstrips demand, this may be reflected in a surplus of skilled workers in terms of unemployment, but also in workers who are overeducated for the jobs they perform. Concerns about this type of skills mismatch go back to at least the 1970s, when increases in the supply of graduates in the United States seemed to outstrip demand. The literature on such skills mismatch has expanded ever since, not least due to the skills intensive nature of much economic and technological change (Cedefop, 2010).

Labour market actors, including governments, companies and workers, need to ensure that occupational requirements are matched through adequate education and training. The extent to which this process is successful is a major factor shaping labour market outcomes, economic growth, productivity and competitiveness (see figure 1 for a graphical representation). If workers are overeducated for the jobs they perform, for example, this means that firms are not fully utilising the productive capacity of their workers, while undereducation means that firms are not operating at their productive frontier by employing less productive workers than they should. Inefficiencies can arise both in the labour market (the demand for and supply of workers/skills) and in the interaction between the labour market and the education and training system. In either case, the resulting skill mismatch will impose costs on individuals, enterprises and society at large.

Labour markets around the world continuously demonstrate various types of 'mismatch', including mismatch between the number of job seekers and employment opportunities, which is reflected in unemployment. In contrast to unemployment, however, which is generally measured according to international standards, a uniform typology or measurement framework regarding skills mismatch and related issues, such as skills shortages, is lacking (ILO, 2014a and 2014b).

Figure 1. Economic context and skills mismatch



Source: ILO (2013).

Skills mismatch is an encompassing term which refers to various types of imbalances between skills offered and skills needed in the world of work. Skills and competencies per se are not measured by the regular statistical programmes of most countries. That is why skill proxies are used, such as qualifications and years of education at the supply side, and occupations at the demand side.

Table 1 lists some of the more frequently discussed types of skills mismatch. Each type of mismatch can be measured in several ways, and each measurement method has advantages and disadvantages.¹ Mismatch at the individual level can manifest itself as undereducation or overeducation. Although education is often used as a proxy for skills, the two terms have a different meaning. A person qualified as a university professor working as a receptionist is clearly overeducated, but may nevertheless lack the communication skills that are necessary in this job and may therefore also be underskilled. However, contrary to education data, cross-country datasets on skills are rare, and usually limited to numeracy and literacy. In the absence of skills data, discussions of skills mismatch are often informed by surveys of employers' or

¹ For overviews, see Johansen and Gatelli (2012); Quintini (2011); Sparreboom and Powell (2009); Wilson et al. (2014).

employees' perceptions regarding skills mismatch, without necessarily clearly defining 'skills'.²

Table 1. Frequently discussed types of skills mismatch

Skill shortage (surplus)	Demand (supply) for a particular type of skill exceeds the supply (demand) of people with that skill
Skill gap	Type or level of skills is different from that required to adequately perform the job
Vertical mismatch	The level of education or qualification is less or more than required
Horizontal mismatch	The type/field of education or skills is inappropriate for the job
Overeducation (undereducation)	Workers have more (less) years of education than the job requires
Overqualification (underqualification)	Workers hold a higher (lower) qualification than the job requires
Skills obsolescence	Skills previously used in a job are no longer required and/or skills have deteriorated over time

Source: ILO (2013).

In this context, this brief examines overeducation and undereducation in Europe. Section 2 reviews the empirical literature on this type of skills mismatch, and then focuses on two measures of mismatch between job requirements and qualifications. The analysis highlights patterns of skills mismatch in Europe, identifies country-specific trends as well as differences in skills mismatch risk between age groups and sexes. Section 3 summarizes the main findings and provides some conclusions.

² In Europe, efforts are undertaken to link the world of work and the world of education and training through the development of the classification of European Skills, Competences, Qualifications and Occupations (ESCO); see <https://ec.europa.eu/esco/home>.

2. Skills mismatch by occupation: Incidence, consequences and measurement

2.1 Incidence and consequences of mismatch

Estimates of mismatch between qualifications and skills of the employed and those required by their work typically vary widely. In country studies reported in the literature, between 10 per cent and one-third of the employed are found to be overeducated and around 20 per cent are undereducated, which results in a total mismatch of between 30 per cent and 50 per cent of the employed in European countries (see tables 2 and 3).

Research also shows that the overeducated face a number of disadvantages compared to the well-matched. For the overeducated, wages are higher than for the well-matched at the same job, but returns to the years of schooling beyond the required level are lower. The overeducated also earn less than those who have the same level of education but do have a job that is matching their education. Undereducated workers earn less than the well-matched at the same job, but more than workers with the same educational level and a matching job (Groeneveld and Hartog, 2004; Hartog, 2000; Rubb, 2003).

Overeducated workers do not necessarily enjoy faster wage growth than the well-matched (Korpi and Tåhlin, 2009), but overeducation has been linked to upward mobility (Dekker et al., 2002). However, lack of career opportunities may result in limited commitment to the workplace (Blenkinsopp and Scurry, 2007), and evidence shows that the overeducated are more likely to engage in a job search (Wald, 2005). Tarvid (2012a) found that overeducated graduates are always less satisfied with their jobs than their well-matched counterparts.

Table 2. Incidence of overeducation in European countries (percentage of employment)

Country	All ^a	Male ^a	Female ^a	Younger workers ^{a,b}
Austria	58.0			1.1 – 10.6
Belgium	10.5 – 54.2			2.0 – 59.0
Czech Republic	50.0	17.4	12.7	1.5 – 9.3
Denmark	34.0			
Estonia	39.0			2.2 – 8.4
Finland	11.1 – 27.0	10.3	14.5	3.3 – 14.1
France	28.0	11.2	17.6	4.4 – 13.9
Germany	11.8 – 60.6	12.3 – 15.6	10.7 – 19.1	2.2 – 12.6
Greece	32.0	26.8	15.0	
Hungary	37.0	23.6	19.8	
Iceland	30.0			
Ireland	33.0			
Italy	13.9 – 71.5	14.9 – 21.3	12.8 – 18.4	4.0 – 19.0
Latvia	43.0			
Lithuania	31.0			

Luxembourg	27.0			
Netherlands	11.2 – 39.0	8.7 – 11.5	12.2 – 13.6	2.9 – 41.7
Norway	16.6 – 34.0			2.5 – 20.4
Poland	13.9 – 29.0			
Portugal	12.6 – 33.0	16.1	14.8	3.4 – 6.5
Romania	25.0			
Slovakia	49.0			
Slovenia	36.0			
Spain	13.8 – 37.2	23.2	24.0	6.5 – 24.8
Sweden	27.0			
Switzerland	13.4-14.9	13.3 – 15.0	13.5 – 14.7	
UK	13.0 – 36.8	19.1 – 25.0	20.5 – 27.0	13.7 – 53.0

Sources: Baert et al. (2013); Barone and Ortiz (2010); Bauer (2002); Blázquez and Budría (2012); Brynin and Longhi (2009); Büchel and Battu (2003); Büchel and Van Ham (2003); Budría (2011); Cainarca and Sgobbi (2012); Chevalier (2003); Croce and Ghignoni (2012); Cutillo and Di Pietro (2006); Dekker et al. (2002); Frei and Sousa-Poza (2012); Ghignoni and Verashchagina (2013); Groot and Van den Brink (2000); Hartog (2000); Jauhainen (2011); Jensen et al. (2010); Karakaya et al. (2007); Kiersztyn (2013); Mavromaras et al. (2010); McGuinness and Bennett (2007); Murillo et al. (2012); Ortiz and Kucel (2008); Ramos and Sanromá (2013); Sánchez-Sánchez and McGuinness (2011); Støren and Wiers-Jenssen (2010); Sutherland (2012); Verhaest and Omeij (2010; 2012); Wirz and Atukeren (2005).

Notes: ^a The incidence of overeducation for all, male, female and younger workers for the same country may be based on different sources. ^b Defined as aged below 31.

Table 3. Incidence of undereducation in European countries (percentage of employment)

Country	All^a	Male^a	Female^a	Younger workers^{a,b}
Austria				8.4 – 30.6
Belgium	25.8 – 32.4			5.4 – 25.5
Czech Republic		17.8	25.6	11.1 – 17.8
Estonia				18.4 – 33.1
Finland		39.4	37.9	10.9 – 26.3
France		44.9	41.4	14.4 – 15.4
Germany	12.1	10.4 – 18.8	15.6 – 21.5	6.3 – 25.9
Greece		21.8	25.6	
Hungary		19.9	24.9	
Italy	17.1	17.7 – 24.7	16.3 – 32.8	11.7 – 22.5
Netherlands	12.0	3.8 – 16.7	2.1 – 14.3	5.3 – 25.2
Norway				11.6 – 29.1
Portugal	17.0 – 38.0	16.6	18.9	22.6 – 50.8
Spain	11.0 – 25.6	33.3	27.8	7.1 – 23.8
Switzerland	1.9	2.0	1.8	
UK	17.0	40.6	43.7	5.5 – 26.1

Sources: Bauer (2002); Cainarca and Sgobbi (2012); Frei and Sousa-Poza (2012); Ghignoni and Verashchagina (2013); Groot and Van den Brink (2000); Hartog (2000); Karakaya et al. (2007); Murillo et al. (2012); Sánchez-Sánchez and McGuinness (2011); Verhaest and Omeij (2012).

Notes: ^a The incidence of undereducation for all, male, female and younger workers for the same country may be based on different sources. ^b Defined as aged below 31.

2.2 *Measurement methods*

The concept of overeducation (undereducation) means having more (less) education than required by the job. The measurement of this concept has proven to be quite controversial. In particular, four different approaches exist in the literature, which are described in table 4. Each of them has its own advantages and disadvantages, and there is no agreement on a single ‘correct’ measure.

In this brief, two of these approaches are used: a normative measure based on the International Standard Classification of Occupations (ISCO-88) alongside a statistical measure (which, in a different way, also uses ISCO). The normative measure starts from the division of major occupational groups (first-digit ISCO levels) into three groups and assigns a level of education to each group in accordance with the International Standard Classification of Education (ISCED-97). In particular, the first three major groups are assigned ISCED levels 5 and 6; major groups 4 to 8 are assigned ISCED-levels 3 and 4; and major group 9 ISCED levels 1 and 2 (see also ILO, 1990 and ILO, 2012). Workers in a particular group who have the assigned level of education are considered well-matched. Those who have a higher (lower) level of education are considered overeducated (undereducated). For instance, a university graduate working as a clerk is overeducated, while a secondary school graduate working as an engineer is undereducated.

An advantage of the normative measure is that workers in a given occupation and with a given level of education are consistently categorized over time as undereducated, overeducated or well-matched. A possible disadvantage of this measure is that it does not take the actual distribution of educational attainment into account. In high-attainment countries, workers in all jobs are better educated and all other things equal the proportion of overeducated is therefore likely to be higher as well. Another disadvantage of this approach concerns the broad range of occupations in major groups 4 to 8. These 5 groups include occupations that require completion of extensive vocational education and training, but also those that require a short period of training plus basic literacy and numeracy (ILO, 2014b).

The statistical measure is constructed based on the years of full-time education of workers and their occupation code. For each 2-digit ISCO group in each country and year, the mean number of years of education of workers as well as its standard deviation is measured. Then the over- (under-) educated are respondents who have education years above (below) the mean level by one standard deviation. In other words, it is assumed that the calculated mean numbers of years for groups of occupations reflects job requirements. An advantage of this method is that there is less heterogeneity within groups of jobs compared with the three groups of the normative measure. Furthermore, if the mean number of years of education of workers in a certain group of occupations rises over time (in comparison with other groups), this may indeed reflect changes in the requirements of these jobs. In addition, the statistical measure is less sensitive to the average level of educational attainment in a country, as increases in educational attainment will result in higher mean levels of education for all workers. But this is also a disadvantage in the sense that mean levels of education may or may not be driven by job requirements. For example, in countries with very low levels of educational attainment, the mean level of education is a poor indicator of job requirements, and the statistical method may be inappropriate (Sparreboom and Nübler, 2013).

Table 4. Measurement of overeducation

Name	Idea	Advantages	Disadvantages	Examples of Studies
Normative	Use a pre-determined mapping between the job and the required education level ^a	<ul style="list-style-type: none"> • Relatively easily measurable • Objective 	<ul style="list-style-type: none"> • Assumes constant mappings over all jobs of a given occupation • A thorough mapping is costly to create and update 	Chevalier (2003) Sutherland (2012) Tarvid (2012b)
Statistical	The overeducated are those with education level higher by some ad-hoc value than the mean or mode of the sample within a given occupation ^b	<ul style="list-style-type: none"> • Relatively easily measurable • Objective • No updating needed: always corresponds to the sample 	<ul style="list-style-type: none"> • Assumes constant mappings over all jobs of a given occupation • Sensitive to cohort effects • Results depend on the level of aggregation of occupations 	Fernández and Ortega (2008) Jauhainen (2011) Ortiz and Kucel (2008)
Self-assessment	The respondents are asked about their perceptions of the extent their education or skills are used in their job ^c	<ul style="list-style-type: none"> • Always up-to-date • Corresponds with requirements in the individual firm 	<ul style="list-style-type: none"> • Subjective bias: respondents may overstate job requirements, inflate their status, or reproduce actual hiring standards 	Di Pietro (2002) Frenette (2004) Støren and Wiers-Jensen (2010) Wirz and Atukeren (2005)
Income-ratio	Overeducation is a <i>continuous</i> variable measured by comparing actual and potential income ^d	<ul style="list-style-type: none"> • Reflects that one of the goals of investment in education is maximising income 	<ul style="list-style-type: none"> • An indirect measure, can be influenced by many other factors 	Jensen et al. (2010) Guironnet and Peypoch (2007)

Source: ILO elaboration; Hartog (2000); Quintini (2011).

Notes:

^a In the United States, the Dictionary of Occupational Titles is often used; alternatively, ISCO-based measures are employed.

^b Usually, the ad-hoc value is one standard deviation, but studies also use 80th percentile of the distribution as a cut-off value.

^c These measures are based not only on a single question about perceived overeducation or skill underutilisation, but also on indices comprised of several such questions (see, e.g., Barone and Ortiz, 2010).

^d This approach connects overeducation to another labour market failure - underpayment.

The data used in this paper to illustrate these two approaches are from the European Social Survey (ESS), rounds 1 through 6 (Norwegian Social Science Data Services, 2002; 2004; 2006; 2008; 2010 and 2012). The ESS is a biennial survey covering over 30 countries, but country coverage differs by round: out of 35 countries for which data are available, only 15 appear in all five rounds.^{3,4}

2.3 Incidence and dynamics of mismatch by occupation

Countries differ markedly in mismatch patterns (see annex tables A1-A8). The incidence of overeducation according to the normative measure ranged from 10 to 20 per cent of all workers in 2012 in most of the 24 countries for which data are available in this year. In four countries the incidence was less than six per cent (Netherlands, Poland, Portugal and Switzerland), while in two countries this incidence exceeded 20 per cent (Cyprus and Russia). The incidence of undereducation according to the normative measure is higher, ranging from 15 to 25 per cent in most countries in 2012. In nine countries the incidence of undereducation exceeded 25 per cent and in one (Portugal) more than half of workers are undereducated. Total mismatch according to the normative measure (25 to 45 per cent) thus appears broadly in line with the findings from the literature that were discussed before (30 to 50 per cent).

The range in overeducation and undereducation according to the statistical measure is smaller. The lowest incidence of overeducation according to this measure was 10.5 per cent in Kosovo, and the highest incidence was 20.1 per cent in Slovakia. Undereducation according to the statistical measure ranged from 8 per cent in Slovakia to 15.6 per cent in the Netherlands.

Considering stable country-specific trends in skills mismatch, we find that in close to half of the countries with sufficient data to assess trends overeducation increased on at least one measure across all workers (13 out of 25 countries; table 5). Overeducation increased on both measures in Cyprus and Sweden. Only four countries experienced a downward trend in overeducation (Ireland, Israel, Poland and Slovenia). Undereducation decreased on at least one measure in 14 out of 25 countries, and decreased on both measures in Bulgaria, Israel, Poland and Slovakia. Undereducation increased on at least one measure in five countries.

In a sample of countries with sufficient data to assess cross-national trends, we find that the average incidence of overeducation is increasing from 2002 to 2012 according to the normative measure (figures 2a and 2b). According to this measure the increase in overeducation was 3.6 percentage points during the whole period. Overeducation according to the mean-based method is more stable over time, at least across all workers (figures 3a and 3b). However, the breakdown by sex shows a tendency of overeducation according to the mean-based method to rise for women and to decline for men. In addition, according to both measures overeducation for women increased

³ ISCO sub-major groups with less than five observations in a particular country and round of the survey have been excluded from the analysis.

⁴ Rounds 1 to 5 of the European Social Survey were coded according to ISCO-88. An updated classification was adopted in December 2007 and is known as ISCO-08 (ILO, 2012). Data from Round 6 of the European Social Survey were coded according to ISCO-08, which may hamper the consistent use of these data over time in the context of skills mismatch.

strongly at the height of the global economic crisis (2008-2010), pointing at the need for female workers to take lower level jobs at times of intense job competition (Cedefop, 2010; ILO, 2013).

Table 5. Country-level trends in mismatch incidence, by age group

	Overeducation						Undereducation					
	15-29		30+		15+		15-29		30+		15+	
	↑	↓	↑	↓	↑	↓	↑	↓	↑	↓	↑	↓
Austria ^a	N				N			IN				
Belgium		N	N		N				N		N	
Bulgaria			I	N	I			I	IN		IN	
Cyprus	IN		IN		IN				I		I	
Czech Republic	IN				I			IN				
Denmark	IN		N		N						N	
Estonia								I		I		I
Finland	I		I		I			IN		I		I
France ^b			N					N		IN		IN
Germany	N		I							I		
Hungary								N				
Ireland		N		I		I						I
Israel		I		IN		IN		I		IN		IN
Netherlands	I		I	N	I			N		I	N	I
Norway		I						IN				
Poland						I		I		IN		IN
Portugal	I		N		N			IN		N		N
Russia												
Slovakia	N	I	N		N			N		IN		IN
Slovenia				I		I		I		I	N	I
Spain	N							N				
Sweden	N		I		IN					I		I
Switzerland			N		N			N			N	
UK								I		I		I
Ukraine ^c		N	N	I	N							

Source: ILO calculations based on the European Social Survey (Norwegian Social Science Data Services, 2002; 2004; 2006; 2008; 2010; 2012).

Note: 'I' shows the existence of a trend in mismatch measured using the ISCO criterion, and 'N' using the mean criterion; unless noted below, trends based on the last three rounds are shown.

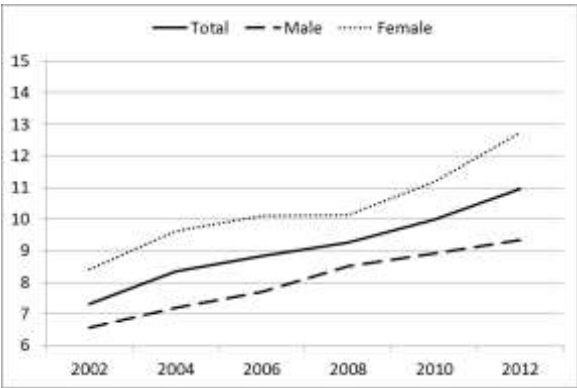
a Data available only in Rounds 1-4.

b Data available only in Rounds 1-5.

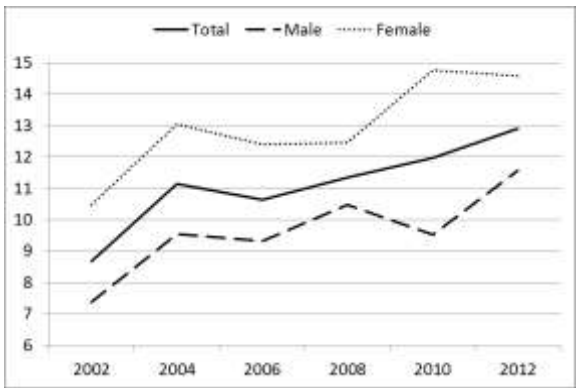
c Data available only in Rounds 2-5.

Figure 2. Average incidence of overeducation by sex (ISCO-based method, %)

a. All workers



b. Age group 15-29

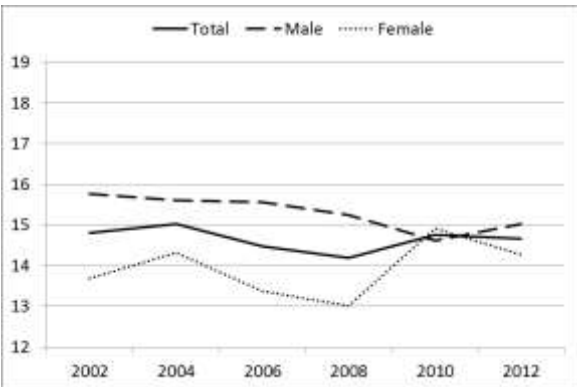


Source: ILO calculations based on the European Social Survey (Norwegian Social Science Data Services, 2002; 2004; 2006; 2008; 2010; 2012).

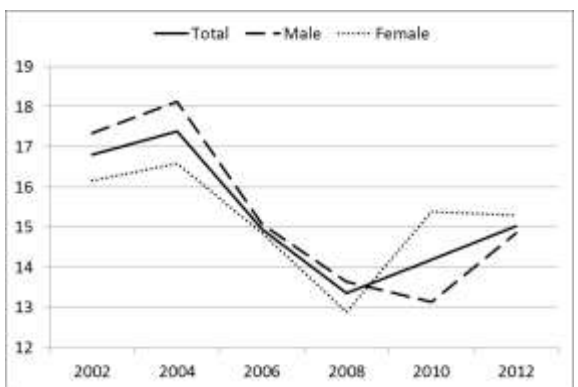
Note: The figures show unweighted averages based on data from the following countries: Belgium, Denmark, Finland, Germany, Hungary, the Netherlands, Norway, Poland, Slovenia, Spain, Sweden and the United Kingdom.

Figure 3. Average incidence of overeducation by sex (mean-based method, %)

a. All workers



b. Age group 15-29



Source: ILO calculations based on the European Social Survey (Norwegian Social Science Data Services, 2002; 2004; 2006; 2008; 2010; 2012).

Note: The figures show unweighted averages based on data from the following countries: Belgium, Denmark, Finland, Germany, Hungary, the Netherlands, Norway, Poland, Slovenia, Spain, Sweden and the United Kingdom.

The breakdown of the average incidence of overeducation by sex also demonstrates the consistently higher incidence for both women and youth according to the normative measure, while results according to the mean-based measure are far less stable over time. Gender differentials may be attributable to several factors, including pressures on women to take caring roles and to reconcile work and family life, while discrimination may also play a role. Other explanatory factors may be the higher representation of women in non-standard employment. Occupational choices in part-time work, for example, are often more limited than in full-time work (Sparreboom, 2014), which may raise the risk of overeducation, and more so if a switch from full-time to part-time employment involves 'occupational downgrading' (Connolly and Gregory, 2008). Another explanatory factor might be that some fields of study in which women are strongly represented, such as economics, law and arts and humanities are more likely to be exposed to overeducation in the labour market (Barone and Ortiz, 2010; Betti et al., 2011; Cuttillo and Di Pietro, 2006; Jauhiainen, 2011; Wirz and Atukeren, 2005).

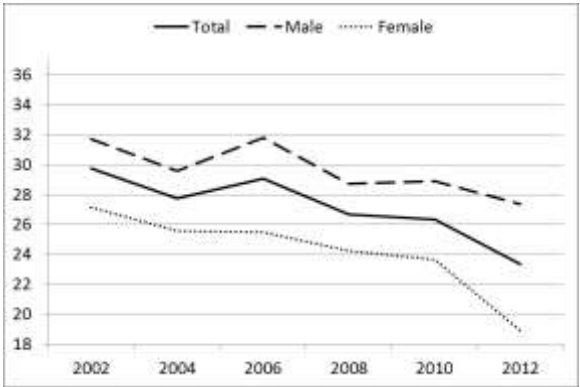
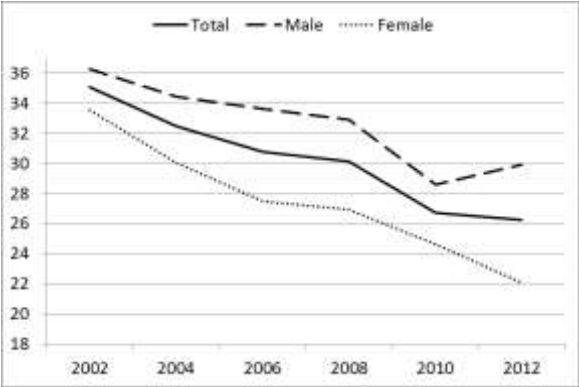
The average incidence of undereducation decreased from 2002 to 2012, by 8.9 percentage points according to the normative measure and by 1 percentage point according to the mean-based measure (figures 4 and 5). The average incidence of undereducation for women is consistently lower than for men according to the normative measure, but not according to the mean-based measure.

Youth are less affected by undereducation than adult workers, and the difference is particularly large according to the mean-based measure. Reasons for the lower incidence of undereducation for youth, as well as the higher incidence of overeducation according to the normative measure, include competition for jobs and, similar to women, the relatively high proportion of young workers in non-standard employment (ILO, 2013).

Figure 4. Average incidence of undereducation by sex (ISCO-based method, %)

a. All workers

b. Age group 15-29

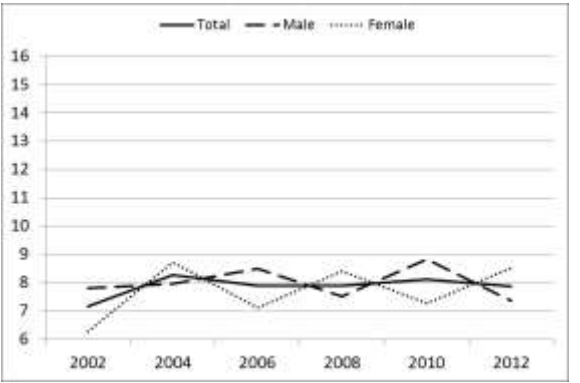
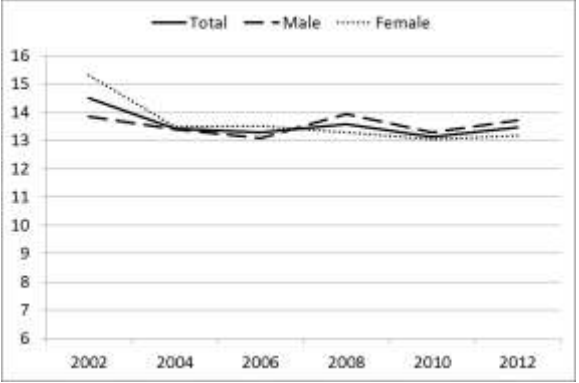


Source: ILO calculations based on the European Social Survey (Norwegian Social Science Data Services, 2002; 2004; 2006; 2008; 2010; 2012).
 Note: The figures show unweighted averages based on data from the following countries: Belgium, Denmark, Finland, Germany, Hungary, the Netherlands, Norway, Poland, Slovenia, Spain, Sweden and the United Kingdom.

Figure 5. Average incidence of undereducation by sex (mean-based method, %)

A. All workers

B. Age group 15-29



Source: ILO calculations based on the European Social Survey (Norwegian Social Science Data Services, 2002; 2004; 2006; 2008; 2010; 2012).
 Note: The figures show unweighted averages based on data from the following countries: Belgium, Denmark, Finland, Germany, Hungary, the Netherlands, Norway, Poland, Slovenia, Spain, Sweden and the United Kingdom.

3. Conclusions

Skills mismatch has been linked to incomplete and asymmetric information, transaction costs and unresponsive education and training systems. Efficient job placement services and training opportunities beyond initial schooling should therefore be priorities for policymakers, and more so if job openings are scarce. The same is true for social dialogue to strengthen linkages between education and training systems and the world of work. Such dialogue should be informed by solid labour market information, but particularly in the area of skills mismatch data are patchy (Cedefop, 2010) and an agreed measurement framework is lacking.

In this brief an attempt was made to identify broad trends in a particular type of skills mismatch – overeducation and undereducation – in European countries. It was shown that skills mismatch patterns depend strongly on the measure of mismatch that is adopted, but also that overeducation is increasing and undereducation is decreasing on at least one measure in at least half of the countries for which such trends can be assessed. On average, the level of skills mismatch is considerable in Europe according to both the normative and the statistical measure that were adopted in this brief, and shows large variations by age group and sex. According to the normative measure, the incidence of overeducation is consistently higher for women and youth.

The analysis at an aggregate level leaves many questions unanswered. For example, it would be informative to establish which occupational groups are most affected by skills mismatch (as captured by various measures), which groups drive national trends, and how these trends relate to structural changes in labour markets such as the declining share of jobs in the middle of the occupational/skill range ('job polarization') in many countries. More detailed empirical investigations, as well as replication of the results using other data sources, would help to assess whether mismatch is likely to be temporal or structural, and which policy interventions are needed.

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Annex A.

Table A1. Incidence of overeducation by sex (ISCO-based, %)

	2002			2004			2006			2008			2010			2012			
	M	F	T	M	F	T	M	F	T	M	F	T	M	F	T	M	F	T	
Austria	3.4	3.8	3.6	6.5	4.9	5.7	4.6	6.1	5.4	5.1	8.8	7.0							
Belgium	7.8	12.8	10.0	10.0	14.1	11.8	6.4	11.7	8.9	5.9	12.6	8.9	11.6	15.6	13.6	8.1	11.9	9.8	
Bulgaria							7.9	7.4	7.6	5.6	8.5	7.1	9.5	12.6	11.2	11.1	14.6	12.9	
Croatia										15.9	11.6	12.8	13.1	13.5	12.9				
Cyprus							15.4	15.7	15.5	14.6	22.6	17.9	13.9	28.3	21.0	23.0	29.1	26.1	
Czech Rep.	5.9	9.0	7.3	4.8	7.0	5.8				4.4	9.9	6.8	6.0	9.7	7.6	6.6	10.1	7.9	
Denmark	13.3	10.6	12.0	11.2	14.8	12.9	8.2	12.8	10.4	12.7	12.3	12.5	10.0	10.9	10.4	14.1	23.3	18.5	
Estonia				12.3	13.0	12.7	9.3	15.6	12.5	11.3	9.6	10.3	17.3	21.2	19.5	11.7	15.5	13.8	
Finland	5.2	14.6	9.7	7.0	16.6	11.8	7.1	15.0	10.7	8.0	11.7	9.7	9.4	13.7	11.5	12.3	19.9	15.9	
France	7.9	11.8	9.7	6.9	9.7	8.3	9.6	11.3	10.4	6.9	10.9	8.9	9.1	11.1	10.1				
Germany	15.1	10.1	12.9	12.5	9.1	10.8	7.9	9.6	8.7	11.5	9.3	10.6	10.8	9.4	10.1	16.0	10.3	13.3	
Greece	6.0	11.6	8.3	10.9	15.2	12.7				8.9	14.1	11.2	9.4	16.9	13.0				
Hungary	6.0	7.0	6.4	4.4	10.4	7.7	9.3	11.8	10.6	13.0	16.2	14.6	7.2	11.0	9.0	11.9	12.2	12.1	
Iceland				15.8	17.6	16.4										6.0	8.4	7.1	
Ireland	10.1	15.1	12.4	11.1	14.8	12.9	12.4	23.8	18.0	20.1	26.4	23.2	22.5	13.6	18.1	17.1	16.9	17.0	
Israel	10.3	13.3	11.6							14.0	18.6	16.6	14.2	15.0	14.6	10.6	14.5	12.6	
Italy	2.1	2.1	2.1	3.8	4.9	4.2													
Kosovo																13.7	3.2	11.5	
Latvia							10.0	14.1	12.2	16.8	18.4	17.8							
Lithuania										28.6	26.8	27.7	11.3	19.4	16.5				
Luxembourg	5.8	5.7	5.8	3.8	3.2	3.6													
Netherlands	2.4	3.6	3.0	4.3	4.0	4.1	4.0	5.8	4.8	3.0	1.5	2.3	4.6	3.3	3.9	4.4	7.0	5.7	
Norway	5.8	5.5	5.6	8.9	10.5	9.6	8.0	10.9	9.4	5.5	9.5	7.3	11.4	13.1	12.2	6.7	8.0	7.3	
Poland	2.0	6.0	3.6	4.1	6.2	5.0	6.3	6.4	6.3	5.5	5.4	5.5	4.2	7.0	5.4	3.0	7.4	5.0	
Portugal	1.4	2.3	1.9	2.2	3.5	2.9	1.8	2.8	2.3	2.9	3.0	2.9	2.7	6.1	4.5	1.7	5.7	4.0	
Romania							9.5	7.5	8.7	13.3	7.5	10.1							
Russia							33.9	30.4	32.1	38.9	28.8	33.7	34.7	30.5	32.6	49.5	40.6	44.5	
Slovakia				9.6	7.7	8.7	9.4	8.3	8.9	9.6	10.4	10.0	7.5	14.8	11.1	10.3	10.9	10.7	
Slovenia	3.7	7.1	5.3	2.3	8.3	5.1	4.8	9.7	7.2	10.6	14.1	12.3	6.8	13.5	10.1	7.5	11.6	9.4	
Spain	7.1	13.9	9.2	7.4	10.6	8.8	7.5	12.6	9.7	7.8	12.6	10.0	11.3	12.0	11.6	5.9	15.1	10.4	
Sweden	4.2	3.1	3.7	4.8	5.2	5.0	6.7	4.2	5.6	4.9	5.0	4.9	6.4	7.5	7.0	8.9	11.5	10.0	
Switzerland	7.2	5.4	6.2	10.8	7.8	9.4	5.1	5.1	5.1	5.7	5.1	5.4	10.0	8.3	9.2	5.5	5.8	5.7	
Turkey				7.1	0.7	5.8				7.2	9.8	7.7							
UK	6.3	6.6	6.4	9.5	5.6	7.6	16.3	10.9	13.7	13.7	11.4	12.6	13.2	17.1	15.1	13.3	14.7	14.1	
Ukraine				38.3	32.6	35.3	37.9	29.8	34.0	27.2	26.1	26.6	27.7	28.4	28.1				

Source: ILO calculations based on the European Social Survey (Norwegian Social Science Data Services, 2002; 2004; 2006; 2008; 2010; 2012).

Table A2. Incidence of overeducation for youth, by sex (ISCO-based, %)

	2002			2004			2006			2008			2010			2012		
	M	F	T	M	F	T	M	F	T	M	F	T	M	F	T	M	F	T
Austria	5.1	1.9	3.4	5.4	2.0	4.0	2.2	5.3	3.7	5.0	11.4	8.7						
Belgium	6.6	11.3	8.2	13.1	18.2	15.5	5.8	14.7	9.7	6.7	18.3	11.8	18.1	18.9	18.5	9.7	10.8	10.2
Bulgaria							7.3	3.9	5.5	7.7	3.8	5.7	15.5	13.6	14.7	8.7	12.1	10.1
Croatia										20.2	12.5	16.6	16.5	11.1	13.3			
Cyprus							23.1	21.7	22.6	20.2	22.5	21.3	23.6	42.9	33.2	23.9	49.5	36.1
Czech Rep.	6.4	5.2	6.0	7.0	5.6	6.4				2.5	10.1	5.4	4.5	10.3	6.8	5.8	15.7	10.9
Denmark	17.9	12.3	15.1	11.7	14.3	12.9	4.7	9.3	6.5	8.0	7.3	7.7	6.0	11.8	8.9	9.2	24.6	15.8
Estonia				9.2	6.5	8.0	3.8	15.5	8.9	7.1	12.5	9.8	13.0	21.0	16.5	10.8	14.0	12.3
Finland	10.7	18.1	14.1	11.5	19.2	14.9	9.6	15.1	11.9	7.8	14.1	10.4	7.5	13.5	10.6	11.0	14.9	12.8
France	18.8	30.7	24.0	24.0	14.7	19.0	17.9	13.2	15.9	11.1	12.9	12.1	13.2	15.9	14.6			
Germany	7.8	6.8	7.3	10.8	5.9	8.5	6.1	6.2	6.1	11.8	8.2	10.3	4.9	4.3	4.7	12.4	10.7	11.7
Greece	7.1	18.4	11.3	17.2	26.3	21.8				12.7	20.9	16.2	13.9	17.1	15.3			
Hungary	3.6	6.7	4.9	4.9	12.3	8.9	8.0	17.0	11.8	30.2	16.9	23.6	10.0	10.8	10.4	12.4	16.2	14.3
Iceland				23.1	23.4	23.3										3.9	3.8	3.9
Ireland	11.9	29.4	21.0	13.3	18.2	15.9	19.8	38.6	28.5	35.2	42.2	38.5	18.4	18.0	18.2	25.8	26.3	26.0
Israel	14.9	13.9	14.4							17.3	24.6	21.0	16.8	12.6	15.0	10.2	11.7	10.9
Italy	5.1	3.2	4.5	4.0	7.2	5.3												
Kosovo																22.5	0.9	17.6
Latvia							8.5	9.4	9.0	17.9	16.7	17.4						
Lithuania										15.3	16.2	15.7	23.2	9.6	16.5			
Luxembourg	5.8	5.6	5.6	2.6	6.4	3.8												
Netherlands	3.9	6.0	4.9	7.6	1.6	4.6	7.8	6.8	7.3	5.4	1.3	3.1	7.1	4.8	5.9	9.6	6.8	8.1
Norway	5.0	4.8	4.9	15.8	21.4	18.4	9.1	17.9	13.5	5.4	15.9	10.6	7.9	14.9	10.9	7.1	6.5	6.8
Poland	3.4	16.0	8.7	7.5	12.4	9.5	11.9	11.0	11.4	12.0	11.9	11.9	6.9	18.3	11.6	6.6	19.6	12.2
Portugal	3.7	6.1	4.7	4.7	3.3	3.9	3.4	6.3	4.7	3.3	11.5	7.3	4.4	13.1	9.0	2.3	16.0	9.0
Romania							8.8	7.4	8.1	19.9	9.1	14.5						
Russia							32.1	17.1	24.6	37.8	26.5	32.8	28.5	23.7	26.4	50.8	45.6	48.5
Slovakia				5.9	11.1	8.3	6.3	7.1	6.6	14.2	11.3	12.7	10.4	13.4	11.7	15.7	6.9	10.6
Slovenia	4.7	10.8	7.5	3.9	15.4	9.2	3.9	8.9	6.0	14.6	14.3	14.5	10.2	20.0	14.4	15.9	9.9	13.2
Spain	10.9	19.6	14.8	10.0	17.1	13.1	11.1	19.1	14.7	8.2	16.6	12.4	9.0	15.4	12.7	15.8	24.4	19.7
Sweden	4.5	4.0	4.3	5.8	8.3	7.0	10.8	6.7	8.8	5.2	11.6	7.9	8.1	14.5	11.1	9.2	8.9	9.0
Switzerland	5.0	4.3	4.7	11.3	3.7	7.6	2.5	5.5	4.0	3.9	5.4	4.6	4.3	3.0	3.7	3.1	7.2	5.0
Turkey				8.4	0.0	5.8				8.1	7.9	8.0						
UK	9.5	9.3	9.4	12.0	10.5	11.2	23.0	16.1	19.9	10.5	13.2	12.0	18.5	30.1	24.0	20.0	21.6	21.0
Ukraine				45.3	27.8	38.3	43.3	35.7	40.2	26.5	11.5	20.3	29.2	31.0	30.0			

Source: ILO calculations based on the European Social Survey (Norwegian Social Science Data Services, 2002; 2004; 2006; 2008; 2010; 2012).

Table A3. Incidence of overeducation by sex (mean-based, %)

	2002			2004			2006			2008			2010			2012			
	M	F	T	M	F	T	M	F	T	M	F	T	M	F	T	M	F	T	
Austria	12.7	10.1	11.3	15.0	7.4	11.1	15.6	11.7	13.6	14.1	15.7	14.9							
Belgium	15.6	11.2	13.8	15.0	14.6	14.9	13.7	14.9	14.3	13.9	12.1	13.1	14.2	14.2	14.2	16.8	12.1	14.6	
Bulgaria							11.8	11.4	11.6	15.0	11.0	12.9	12.9	13.6	13.3	11.7	11.5	11.6	
Croatia										17.8	11.5	14.6	11.0	14.2	12.8				
Cyprus							10.2	11.0	10.7	12.3	12.2	12.2	15.1	14.4	14.5	15.4	13.7	14.6	
Czech Rep.	14.5	8.5	11.7	12.1	11.7	11.9				12.2	12.8	12.5	11.4	10.5	11.0	14.1	12.3	13.2	
Denmark	15.3	14.0	14.7	13.0	13.7	13.4	12.1	11.7	11.9	13.6	11.6	12.6	13.7	12.4	13.1	14.9	17.0	15.9	
Estonia				12.9	15.7	14.4	12.7	13.0	12.8	15.7	13.1	14.3	14.4	12.8	13.5	16.5	13.9	15.1	
Finland	12.2	15.9	14.0	15.4	13.5	14.5	12.6	15.9	14.1	13.2	15.1	14.1	14.6	14.1	14.4	13.4	14.3	13.8	
France	15.6	10.7	13.2	18.3	15.3	16.7	16.0	12.0	14.1	13.9	13.6	13.8	16.2	13.8	14.9				
Germany	17.5	14.8	16.3	16.9	12.2	14.9	15.7	11.2	13.7	15.5	11.2	13.5	16.5	13.2	15.0	15.7	12.8	14.4	
Greece	15.0	8.3	12.3	15.5	13.7	14.8				13.7	13.2	13.5	14.1	11.7	13.0				
Hungary	16.0	10.5	13.6	14.3	18.7	16.6	19.2	15.0	16.7	18.5	11.8	15.1	12.3	15.2	13.7	16.2	15.1	15.6	
Iceland				13.5	11.4	12.6										13.8	14.8	14.3	
Ireland	15.9	14.5	15.2	15.7	17.6	16.7	12.4	13.1	12.4	13.1	15.4	14.3	20.2	14.3	17.3	15.9	12.7	14.4	
Israel	16.5	14.9	15.3							14.5	16.2	15.5	15.1	14.3	14.8	11.6	16.4	14.0	
Italy	17.8	10.2	14.5	14.4	14.6	14.4													
Kosovo																11.2	8.3	10.5	
Latvia							14.6	16.2	15.3	15.7	13.9	14.7							
Lithuania										17.4	14.8	16.1	11.2	14.5	13.3				
Luxembourg	18.2	16.4	17.5	15.5	15.0	15.3													
Netherlands	16.7	13.5	15.1	18.5	10.9	14.6	12.6	12.0	12.3	15.7	11.5	13.7	18.2	11.2	14.7	13.8	11.4	12.6	
Norway	16.7	13.3	15.1	14.7	13.1	14.0	16.1	13.6	14.9	15.8	15.7	15.8	14.9	18.4	16.5	14.6	14.2	14.4	
Poland	16.0	14.0	15.1	14.6	17.1	15.7	16.6	15.1	15.9	16.9	11.8	14.6	16.1	15.8	15.9	13.8	15.7	14.7	
Portugal	18.3	10.3	14.5	16.6	14.7	15.7	18.5	15.5	16.9	16.4	10.3	13.2	16.1	11.5	13.7	17.9	13.0	15.1	
Romania							16.5	8.2	12.6	12.2	11.3	11.9							
Russia							14.2	10.3	12.1	15.9	13.4	14.5	19.0	12.5	15.6	16.4	13.5	14.7	
Slovakia				14.7	7.9	12.1	14.4	8.6	11.3	17.8	13.7	15.9	17.0	20.4	18.7	18.7	21.5	20.1	
Slovenia	17.8	13.7	15.8	12.5	14.4	13.6	17.0	12.0	14.5	17.0	13.7	15.4	9.1	15.2	12.0	14.9	15.7	15.3	
Spain	16.4	16.3	16.2	14.6	16.4	15.4	16.6	14.5	15.7	14.1	15.1	14.6	18.1	17.0	17.6	14.4	15.5	14.9	
Sweden	13.8	14.1	13.9	13.8	12.0	13.0	14.7	10.5	12.7	13.2	14.0	13.6	14.9	15.0	14.9	16.3	12.8	14.7	
Switzerland	15.1	12.3	13.6	15.6	13.2	14.5	14.6	9.6	12.2	15.6	16.1	15.8	17.5	15.5	16.6	19.6	15.4	17.7	
Turkey				17.9	9.2	16.0				17.3	19.6	17.8							
UK	15.1	12.9	14.1	23.9	15.2	19.6	19.9	14.1	17.0	15.5	12.5	14.2	12.7	17.2	15.0	15.4	14.7	15.0	
Ukraine				16.1	6.8	11.1	14.8	9.0	12.0	17.4	15.4	16.3	14.9	17.6	16.5				

Source: ILO calculations based on the European Social Survey (Norwegian Social Science Data Services, 2002; 2004; 2006; 2008; 2010; 2012).

Table A4. Incidence of overeducation for youth, by sex (mean-based, %)

	2002			2004			2006			2008			2010			2012		
	M	F	T	M	F	T	M	F	T	M	F	T	M	F	T	M	F	T
Austria	10.0	8.8	9.4	9.5	8.4	9.0	11.7	15.6	13.6	18.1	24.8	22.0						
Belgium	17.1	15.2	16.1	20.2	15.4	18.0	14.8	15.9	15.3	11.5	18.7	14.7	12.3	15.7	14.1	15.9	8.5	12.4
Bulgaria							14.1	18.9	16.8	17.0	10.3	13.5	22.0	19.6	21.0	7.5	15.5	10.8
Croatia										22.7	17.4	20.2	6.5	25.1	18.0			
Cyprus							14.1	12.3	13.4	12.4	14.1	13.3	18.1	25.6	21.8	15.6	29.7	22.4
Czech Rep.	8.4	8.3	8.3	13.8	18.4	15.8				10.6	8.6	9.9	15.0	18.9	16.5	30.2	21.7	25.7
Denmark	18.4	12.5	15.4	9.7	6.6	8.3	3.8	2.7	3.4	10.1	2.0	6.7	12.2	6.7	9.3	7.2	14.5	10.5
Estonia				15.4	16.5	15.9	11.4	18.3	14.4	7.6	12.0	9.7	14.3	23.0	18.1	14.4	12.1	13.4
Finland	13.6	19.6	16.3	20.0	22.1	21.0	11.8	15.5	13.4	7.5	14.3	10.5	9.7	9.6	9.6	8.6	14.9	11.5
France	25.9	10.1	19.1	29.9	19.0	24.0	27.3	19.2	24.0	21.6	9.0	15.0	18.6	18.4	18.5			
Germany	13.2	13.2	13.2	13.2	4.9	9.3	16.0	13.6	14.9	10.0	8.4	9.3	11.0	13.1	12.0	13.8	16.1	14.8
Greece	14.9	10.1	13.1	22.5	15.6	19.0				12.9	22.9	17.3	17.6	15.3	16.6			
Hungary	11.3	6.9	9.4	10.3	28.7	19.7	11.6	19.7	15.1	22.0	13.4	17.6	13.0	14.1	13.5	17.8	17.2	17.5
Iceland				12.5	20.9	17.3										8.2	4.1	6.1
Ireland	21.7	23.4	22.6	20.5	27.1	23.9	14.3	16.9	15.5	21.6	24.5	23.0	21.4	17.3	19.6	22.2	10.9	17.3
Israel	8.8	6.9	7.9							7.7	6.4	7.1	8.0	7.0	7.5	5.6	9.5	7.4
Italy	29.1	24.4	27.5	18.7	18.8	18.7												
Kosovo																15.7	0.9	12.1
Latvia							9.2	21.3	15.4	18.8	14.4	17.2						
Lithuania										20.4	21.1	20.7	5.1	15.7	10.2			
Luxembourg	21.6	16.4	18.5	16.6	23.6	18.8												
Netherlands	19.2	17.8	18.5	30.2	9.7	19.7	10.3	13.2	11.7	12.1	11.6	11.8	22.9	15.4	18.8	10.7	7.2	8.7
Norway	11.3	13.9	12.5	20.2	11.9	16.4	14.4	8.1	11.2	8.9	10.5	9.7	6.4	10.2	8.1	14.3	8.2	11.8
Poland	27.0	26.8	26.9	20.2	20.9	20.5	23.9	20.1	22.2	21.0	20.3	20.7	17.1	16.4	16.8	11.4	27.6	18.4
Portugal	27.9	14.5	22.2	38.4	24.9	31.6	35.7	35.6	35.6	24.6	31.7	28.2	19.9	21.3	20.7	26.2	24.3	25.2
Romania							17.5	11.9	15.0	17.5	11.7	14.6						
Russia							9.8	13.1	11.5	22.4	18.8	20.8	11.0	17.7	14.0	14.7	16.8	15.6
Slovakia				4.3	9.1	6.5	10.7	10.7	10.7	13.5	19.0	16.2	11.3	18.8	14.7	9.0	32.9	22.9
Slovenia	21.3	22.5	21.9	16.0	25.5	20.2	15.9	21.2	18.2	25.0	19.6	23.0	17.5	23.3	20.0	25.8	17.7	22.1
Spain	23.8	14.8	19.7	15.0	13.9	14.5	21.9	14.4	18.6	16.5	12.7	14.6	13.6	22.4	18.5	24.8	23.5	24.3
Sweden	18.0	13.3	16.1	15.5	14.5	15.1	13.3	14.8	14.0	9.0	7.1	8.2	9.8	9.1	9.5	14.7	11.5	13.1
Switzerland	9.8	14.5	12.2	8.9	16.9	12.6	8.0	5.4	6.6	19.8	18.8	19.3	11.0	12.9	11.8	17.2	19.2	18.1
Turkey				22.9	11.7	19.4				25.0	8.1	19.5						
UK	13.8	17.4	15.6	27.0	24.8	25.9	23.2	19.0	21.3	10.1	16.0	13.5	12.2	28.6	20.1	13.2	16.6	15.2
Ukraine				22.8	3.6	14.6	18.4	16.3	17.4	15.3	18.9	16.9	15.7	17.7	16.5			

Source: ILO calculations based on the European Social Survey (Norwegian Social Science Data Services, 2002; 2004; 2006; 2008; 2010; 2012).

Table A5. Incidence of undereducation by sex (ISCO-based, %)

	2002			2004			2006			2008			2010			2012		
	M	F	T	M	F	T	M	F	T	M	F	T	M	F	T	M	F	T
Austria	48.2	39.7	43.8	37.7	33.5	35.5	43.3	37.2	40.1	37.7	31.8	34.7						
Belgium	31.4	23.1	27.9	31.0	22.3	27.2	37.4	20.7	29.4	34.0	18.7	27.2	26.7	21.4	24.1	33.3	19.9	27.1
Bulgaria							25.2	18.5	21.5	25.9	21.2	23.4	24.2	16.1	19.9	18.1	12.8	15.3
Croatia										17.3	14.4	16.3	15.9	14.9	15.5			
Cyprus							25.1	12.9	19.8	23.7	16.3	20.6	25.9	10.8	18.6	20.1	13.4	16.8
Czech Rep.	21.4	28.6	24.5	20.5	34.1	27.1				24.8	28.2	26.3	17.5	23.8	20.3	22.2	26.7	24.3
Denmark	27.5	24.4	26.0	21.5	14.8	18.2	25.8	18.0	22.2	25.1	17.6	21.5	26.1	25.0	25.6	23.6	12.7	18.4
Estonia				23.4	25.8	24.7	26.7	25.2	25.9	26.9	32.9	30.2	24.0	18.5	21.0	22.3	16.7	19.3
Finland	37.8	24.1	31.2	33.3	19.1	26.2	27.6	17.6	23.0	27.1	18.5	23.1	27.3	17.0	22.4	22.5	12.6	17.9
France	28.0	26.0	27.0	35.8	27.7	31.7	26.7	23.8	25.3	31.4	23.7	27.5	33.2	26.5	29.7			
Germany	19.4	29.8	24.2	20.6	30.5	25.4	21.7	32.3	26.3	21.0	29.6	24.6	21.3	29.4	24.9	18.3	26.4	22.1
Greece	46.6	43.2	45.2	39.4	28.7	34.9				38.4	30.1	34.6	31.0	26.0	28.7			
Hungary	19.5	28.9	23.6	24.2	24.2	24.3	13.5	13.4	13.5	16.9	25.1	20.8	7.0	6.3	6.6	15.5	22.3	19.1
Iceland				31.1	31.0	31.1										42.6	31.5	37.3
Ireland	38.4	32.3	35.6	44.6	29.1	36.9	34.4	24.6	29.6	33.1	16.5	25.1	23.1	21.2	22.1	24.2	22.5	23.4
Israel	33.8	28.9	31.4							34.2	20.5	27.6	32.4	20.6	26.2	29.7	17.5	23.3
Italy	58.5	46.7	53.3	47.7	37.8	43.8												
Kosovo																29.1	42.4	31.9
Latvia							23.9	18.7	20.9	16.0	16.5	16.3						
Lithuania										11.7	5.3	8.5	17.5	13.2	15.1			
Luxembourg	44.5	36.8	40.9	48.2	35.9	43.8												
Netherlands	50.7	53.6	52.1	45.8	49.4	47.6	46.8	50.5	48.5	47.9	46.9	47.4	44.8	50.5	47.7	39.9	32.6	36.3
Norway	23.8	22.3	23.1	24.4	20.2	22.5	22.2	16.3	19.4	21.4	16.7	19.3	17.8	12.8	15.5	22.5	16.1	19.7
Poland	58.2	51.8	55.6	60.1	40.2	51.1	56.4	39.8	48.9	51.1	37.8	45.1	46.4	32.0	40.1	48.0	29.7	39.8
Portugal	74.4	50.2	62.8	70.9	51.2	60.9	63.3	49.6	55.9	62.2	48.0	54.8	61.3	49.3	54.9	59.4	46.6	52.3
Romania							20.9	34.1	27.1	29.3	37.3	33.3						
Russia							10.3	8.2	9.3	5.8	7.8	6.8	8.4	8.6	8.5	6.0	4.1	5.0
Slovakia				25.0	28.3	26.6	21.4	30.2	25.5	19.0	27.9	23.6	17.7	23.5	20.6	16.1	18.0	17.0
Slovenia	28.7	31.2	29.9	27.2	23.7	25.9	27.3	24.4	25.8	28.3	24.3	26.4	24.1	19.0	21.6	23.5	18.2	21.1
Spain	49.1	36.0	43.6	46.7	40.8	44.1	52.1	33.6	44.2	51.7	31.6	42.6	40.4	29.9	35.5	52.1	31.0	42.0
Sweden	42.8	29.5	36.9	38.4	25.7	32.5	35.9	26.9	31.6	35.5	24.1	30.0	28.0	21.0	24.5	28.0	15.2	21.9
Switzerland	30.5	40.1	34.9	27.5	36.7	31.8	27.1	37.2	31.9	32.0	37.2	34.6	26.0	33.1	29.2	27.1	33.0	29.8
Turkey				55.3	32.3	50.4				60.6	26.7	55.2						
UK	46.8	47.8	47.3	40.4	49.9	45.1	36.8	36.5	36.6	35.0	32.1	33.6	33.5	31.4	32.4	31.9	28.3	29.8
Ukraine				3.3	5.7	4.6	7.1	3.5	5.4	7.6	7.9	7.8	2.5	2.3	2.4			

Source: ILO calculations based on the European Social Survey (Norwegian Social Science Data Services, 2002; 2004; 2006; 2008; 2010; 2012).

Table A6. Incidence of undereducation for youth, by sex (ISCO-based, %)

	2002			2004			2006			2008			2010			2012			
	M	F	T	M	F	T	M	F	T	M	F	T	M	F	T	M	F	T	
Austria	43.4	33.0	38.1	47.3	36.5	43.0	44.8	35.3	40.2	34.7	28.4	31.1							
Belgium	28.7	18.8	24.7	23.2	15.9	19.8	41.9	13.2	29.2	23.4	11.3	18.0	27.8	20.3	24.0	21.5	21.7	21.6	
Bulgaria							23.9	18.9	21.2	21.5	20.6	21.0	19.5	16.2	18.1	23.3	7.2	16.6	
Croatia										15.0	12.1	13.6	6.9	5.8	6.3				
Cyprus							17.1	1.7	11.6	10.7	7.0	8.9	16.0	4.8	10.8	0.0	0.0	0.0	
Czech Rep.	22.9	30.8	25.8	16.8	33.4	23.9				25.9	33.7	28.8	16.7	20.4	18.2	10.1	26.3	18.5	
Denmark	26.9	29.6	28.3	23.4	27.0	25.0	39.1	20.9	31.8	29.3	38.2	33.1	44.0	33.3	38.6	34.2	28.1	31.6	
Estonia				33.3	16.3	25.9	34.9	25.0	30.5	34.5	31.3	32.9	29.9	16.1	23.7	30.0	14.0	22.7	
Finland	15.2	18.1	16.5	27.1	14.1	21.3	21.7	16.3	19.4	22.4	8.2	16.4	29.9	8.1	18.4	22.0	14.9	18.8	
France	11.0	7.8	9.6	16.7	14.4	15.4	11.5	11.2	11.4	17.4	27.7	22.8	18.4	15.0	16.6				
Germany	34.3	34.6	34.4	28.3	38.4	33.0	32.6	34.3	33.4	27.2	33.9	29.9	40.1	49.1	44.2	26.1	31.5	28.5	
Greece	40.7	22.1	33.8	23.1	13.2	18.1				34.3	11.5	24.4	25.4	8.9	18.1				
Hungary	25.0	16.7	21.5	38.1	12.4	24.2	17.6	16.8	17.3	15.1	18.8	16.9	4.1	7.3	5.5	12.6	12.1	12.4	
Iceland				35.9	34.0	34.9										57.0	41.6	49.7	
Ireland	24.3	26.4	25.4	25.7	18.6	21.9	24.7	16.2	20.9	9.9	11.2	10.5	19.2	13.5	16.6	9.5	5.0	7.6	
Israel	34.8	27.0	31.2							28.1	17.9	24.1	26.1	21.7	26.8	30.4	22.1	26.7	
Italy	52.2	32.6	45.2	45.0	23.5	35.9													
Kosovo																19.2	41.7	24.3	
Latvia							31.0	19.6	25.1	12.5	15.3	13.5							
Lithuania										15.3	8.1	12.4	12.7	13.5	13.1				
Luxembourg	40.7	36.9	39.2	45.8	25.7	39.6													
Netherlands	52.1	40.5	46.5	34.8	47.8	41.3	45.6	53.1	49.1	36.8	42.1	39.7	43.5	46.2	45.0	35.9	31.1	33.2	
Norway	10.6	18.6	14.3	12.9	13.1	13.0	10.0	8.9	9.5	15.2	14.8	15.0	18.6	12.7	16.0	26.5	16.9	22.6	
Poland	52.9	38.1	46.6	55.1	21.9	41.5	42.0	26.4	34.9	40.9	26.1	34.7	31.2	11.7	23.2	32.1	7.7	21.7	
Portugal	69.6	44.5	58.7	58.6	53.1	55.7	54.3	47.1	50.9	45.0	40.8	42.9	47.5	27.0	36.6	50.6	29.4	40.1	
Romania							25.0	38.2	31.1	25.0	33.7	29.4							
Russia							10.0	13.5	11.8	8.9	6.9	8.1	10.1	7.9	9.1	2.8	1.7	2.3	
Slovakia				24.8	18.5	22.3	14.3	22.4	17.8	18.5	25.8	22.2	25.6	29.8	27.5	19.7	9.5	13.7	
Slovenia	17.6	23.0	20.1	22.4	19.2	20.6	23.4	23.2	23.3	27.0	21.4	24.8	22.0	17.8	20.2	16.7	7.0	12.2	
Spain	42.1	31.4	37.2	39.9	41.8	40.7	50.8	40.8	46.3	50.8	35.0	42.8	40.2	32.5	35.8	49.1	25.9	38.7	
Sweden	25.2	16.0	21.5	19.4	16.7	18.2	22.6	14.6	18.7	18.1	14.0	16.3	17.7	21.8	19.7	15.8	12.7	14.2	
Switzerland	49.6	45.0	47.4	28.6	38.9	33.6	31.4	37.3	34.4	31.3	40.7	35.8	41.5	43.3	42.2	35.7	32.5	34.3	
Turkey				49.4	31.2	43.8				59.6	25.3	48.4							
UK	50.2	40.6	45.4	30.3	38.5	34.4	34.3	37.3	35.7	38.5	27.2	32.3	27.6	23.1	25.5	35.7	17.2	24.7	
Ukraine				1.2	8.3	4.0	6.0	4.9	5.5	11.8	7.5	10.0	2.3	2.6	2.4				

Source: ILO calculations based on the European Social Survey (Norwegian Social Science Data Services, 2002; 2004; 2006; 2008; 2010; 2012).

Table A7. Incidence of undereducation by sex (mean-based, %)

TOTAL	2002			2004			2006			2008			2010			2012			
	M	F	T	M	F	T	M	F	T	M	F	T	M	F	T	M	F	T	
Austria	14.2	15.1	14.4	12.9	15.5	14.3	13.4	10.7	12.0	13.3	13.7	13.5							
Belgium	14.4	16.2	15.1	16.9	13.7	15.5	16.4	14.9	15.7	15.4	14.8	15.1	15.5	12.0	13.7	13.0	9.4	11.4	
Bulgaria							18.2	12.2	14.5	15.6	13.2	14.3	13.9	8.5	11.1	9.3	9.3	9.3	
Croatia										8.7	8.8	9.1	7.9	11.2	9.6				
Cyprus							11.6	13.9	12.8	10.6	13.3	11.7	14.6	10.8	12.7	12.0	12.5	12.3	
Czech Rep.	9.5	9.4	9.5	10.6	13.6	12.1				7.1	13.8	10.0	9.3	12.9	10.9	9.7	10.7	9.8	
Denmark	16.5	15.9	16.2	14.5	15.0	14.7	14.2	13.5	13.9	16.5	11.3	14.0	13.2	15.4	14.2	15.8	13.7	14.8	
Estonia				14.9	14.6	14.7	17.5	14.2	15.8	11.5	16.6	14.4	17.3	18.0	17.7	16.6	13.9	15.2	
Finland	18.9	14.9	17.0	14.5	15.4	14.9	14.9	14.1	14.5	14.0	13.6	13.8	14.2	10.0	12.1	15.7	11.2	13.6	
France	12.4	16.2	14.2	12.2	11.9	12.1	11.2	12.8	11.9	14.8	10.7	12.7	16.6	13.3	14.9				
Germany	11.2	18.7	14.7	13.2	16.5	14.5	11.7	14.4	12.9	13.7	14.8	14.1	14.6	14.6	14.6	11.8	16.7	14.0	
Greece	13.6	12.8	13.3	11.7	10.5	11.2				11.8	14.0	12.8	12.0	11.3	11.7				
Hungary	8.0	15.7	11.4	11.4	7.8	9.6	9.0	12.2	10.7	10.7	17.0	13.8	6.1	11.8	8.9	10.3	13.3	11.9	
Iceland				13.5	15.0	14.1										16.3	13.5	15.0	
Ireland	14.5	12.8	13.7	15.9	13.4	14.6	13.9	12.0	13.0	14.6	13.2	13.9	13.2	11.3	12.3	14.3	12.8	13.6	
Israel	14.2	10.7	12.4							11.5	7.3	10.0	11.3	10.5	11.2	11.1	7.3	9.0	
Italy	15.6	13.7	14.8	15.2	13.7	14.6													
Kosovo																11.8	16.3	12.8	
Latvia							15.9	14.2	15.0	12.3	14.1	13.4							
Lithuania										13.2	10.2	11.6	12.4	11.7	12.2				
Luxembourg	13.7	11.9	12.9	14.4	19.9	16.3													
Netherlands	14.8	17.6	16.2	15.1	16.7	15.9	13.0	13.1	13.0	14.1	11.9	13.0	16.2	15.2	15.7	14.2	17.0	15.6	
Norway	17.7	16.7	17.3	16.5	15.6	16.1	15.0	13.2	14.1	13.5	14.2	13.8	16.3	15.5	15.9	15.0	14.9	15.0	
Poland	13.3	12.7	13.1	11.9	12.9	12.3	11.7	15.6	13.5	14.3	18.5	16.2	13.7	15.4	14.5	12.6	13.7	13.1	
Portugal	14.9	14.1	14.5	16.7	16.0	16.4	14.4	13.0	13.6	16.8	11.8	14.2	11.4	14.6	13.1	13.9	12.7	13.3	
Romania							13.0	14.6	13.9	10.0	13.7	11.7							
Russia							15.1	16.9	15.9	12.2	13.9	13.1	12.0	13.4	12.7	13.9	13.9	13.9	
Slovakia				7.6	10.8	8.9	9.6	14.3	11.8	9.0	13.9	11.4	9.0	12.2	10.6	7.8	8.0	8.0	
Slovenia	13.0	16.0	14.4	11.1	9.5	10.5	12.5	12.0	12.3	13.9	11.0	12.5	14.3	11.8	13.1	12.6	12.6	12.6	
Spain	8.9	12.1	10.3	10.8	9.7	10.2	10.7	12.3	11.4	10.7	9.3	10.0	10.8	14.8	12.6	13.2	11.3	12.3	
Sweden	17.7	16.2	17.0	16.5	18.4	17.4	14.3	14.6	14.5	17.0	12.9	15.0	13.7	10.9	12.3	15.3	11.5	13.4	
Switzerland	8.1	9.5	8.8	10.1	8.6	9.3	11.8	15.2	13.4	9.8	6.0	7.8	11.0	7.1	9.0	12.7	7.3	10.2	
Turkey				7.7	7.7	7.7				5.8	4.4	5.6							
UK	11.7	11.0	11.4	8.3	10.6	9.4	13.6	12.4	13.0	13.5	10.1	11.8	11.0	9.2	10.1	15.1	12.9	13.9	
Ukraine				11.2	11.9	11.5	16.6	12.1	14.4	8.0	18.3	13.6	16.7	12.0	13.9				

Source: ILO calculations based on the European Social Survey (Norwegian Social Science Data Services, 2002; 2004; 2006; 2008; 2010; 2012).

Table A8. Incidence of undereducation for youth, by sex (mean-based, %)

	2002			2004			2006			2008			2010			2012		
	M	F	T	M	F	T	M	F	T	M	F	T	M	F	T	M	F	T
Austria	11.0	12.2	11.6	19.3	12.0	16.4	16.9	5.9	11.6	12.1	8.7	10.1						
Belgium	8.5	2.5	6.2	6.7	7.7	7.2	8.6	4.8	6.9	5.8	2.8	4.5	4.6	0.0	2.2	5.7	6.1	5.9
Bulgaria							23.2	6.3	13.7	14.8	8.6	11.6	17.9	10.4	14.8	12.9	7.5	10.7
Croatia										6.1	3.5	4.9	0.0	3.5	2.2			
Cyprus							6.0	1.8	4.5	0.0	3.7	1.8	9.8	7.0	8.3	3.7	0.0	1.9
Czech Rep.	8.2	8.5	8.3	18.2	4.5	12.2				8.5	14.2	10.6	8.1	9.4	8.6	2.2	8.2	5.4
Denmark	14.5	16.3	15.4	11.1	19.7	15.0	19.2	16.2	18.0	10.1	11.8	10.8	12.2	24.4	18.6	7.2	14.5	10.5
Estonia				13.7	4.4	9.6	21.0	9.8	16.0	8.9	13.3	11.0	13.0	6.6	10.1	18.6	11.1	15.2
Finland	2.7	4.3	3.5	5.6	7.8	6.6	0.9	4.8	2.6	4.7	4.8	4.7	8.1	2.7	5.2	8.6	9.0	8.8
France	4.3	4.6	4.4	3.3	2.8	3.0	1.6	6.1	3.5	2.3	5.6	4.0	11.5	5.4	8.3			
Germany	13.2	14.6	13.9	20.0	17.5	18.8	16.6	6.2	12.1	15.8	14.0	15.1	20.8	10.1	16.0	14.5	15.0	14.7
Greece	6.5	7.4	6.8	3.3	0.5	1.9				8.2	1.0	5.0	9.3	4.5	7.1			
Hungary	7.5	1.7	5.1	14.0	5.4	9.6	7.1	11.5	9.0	6.0	11.5	8.8	5.8	7.2	6.4	5.3	6.7	6.0
Iceland				3.1	7.0	5.3										12.3	14.9	13.6
Ireland	3.5	5.4	4.5	8.2	4.1	6.0	9.8	5.2	7.6	1.3	6.7	3.9	8.0	2.2	5.4	3.4	6.4	4.7
Israel	10.2	12.9	11.5							6.8	3.3	6.1	6.2	14.4	11.0	8.8	3.4	6.4
Italy	6.9	1.7	5.1	9.8	0.8	6.0												
Kosovo																15.8	20.3	16.9
Latvia							12.5	10.2	11.3	11.2	13.4	12.0						
Lithuania										15.7	8.5	12.8	4.8	3.0	3.9			
Luxembourg	4.8	4.0	4.3	4.1	3.7	4.0												
Netherlands	7.6	3.7	5.7	6.5	10.2	8.4	11.4	8.4	9.9	12.7	6.2	9.0	12.9	7.7	10.0	7.1	12.7	10.3
Norway	6.2	6.1	6.1	6.1	7.1	6.6	8.7	7.2	7.9	4.4	7.0	5.7	11.2	9.1	10.2	10.5	15.1	12.4
Poland	9.7	3.4	7.0	6.1	7.3	6.6	6.3	6.3	6.3	5.1	13.2	8.6	10.9	6.4	9.0	8.5	8.3	8.4
Portugal	10.1	4.8	7.8	8.3	2.7	5.5	3.8	3.9	3.8	2.9	4.6	3.7	3.4	0.9	2.0	5.0	0.0	2.5
Romania							10.0	14.9	12.2	9.6	14.9	12.3						
Russia							11.3	13.4	12.3	10.7	6.2	8.7	8.9	9.8	9.3	7.3	6.0	6.7
Slovakia				8.7	13.6	10.1	13.6	9.3	11.8	8.0	8.2	8.1	7.2	2.5	5.1	2.3	0.0	1.0
Slovenia	5.0	8.5	6.6	4.0	4.3	4.0	4.3	1.9	3.3	3.6	5.9	4.4	7.0	7.0	7.0	4.5	0.0	2.5
Spain	7.4	1.7	4.8	8.9	5.5	7.4	7.1	5.0	6.2	8.6	7.2	7.9	4.9	7.1	6.1	2.1	5.7	3.7
Sweden	5.4	8.0	6.5	3.9	7.2	5.4	3.3	3.4	3.4	6.3	6.0	6.2	4.9	3.6	4.3	8.0	6.4	7.2
Switzerland	6.9	5.9	6.4	8.3	3.7	6.2	17.0	15.3	16.1	1.2	2.5	1.8	13.4	6.5	10.4	14.9	6.8	11.3
Turkey				5.9	5.8	5.9				0.4	2.7	1.1						
UK	6.0	4.4	5.1	2.5	4.9	3.7	8.4	9.6	9.0	7.1	10.4	9.0	2.7	1.9	2.3	6.2	2.6	4.0
Ukraine				7.5	10.5	8.7	6.4	10.2	8.2	11.1	19.8	15.0	7.2	9.0	7.9			

Source: ILO calculations based on the European Social Survey (Norwegian Social Science Data Services, 2002; 2004; 2006; 2008; 2010; 2012).

