Project no.	FP6-028987
Project acronym	*EurOccupations*
Project title	Developing a detailed 7-country occupations database forcomparative socio-economic research in the European Union
Instrument:	STREP
Thematic Priority	PRIORITY 7, Research Area 3.2.2.

Paper on gender bias in the EurOccupations database

Third Reporting Period – D23

Project coordinator name:	Erasmus University Rotterdam
Start date of the project:	from 01.05.2006 to 30.04.09 (36 months)
Period covered:	from 01.05.08 to 30.04.09
Report Preparation Date:	30.04.2009
Author of this report:	Judith de Ruijter & Esther de Ruijter (AO Consult)
	Joyce Jacobs (Erasmus University Rotterdam)

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Summary

This paper describes possible gender bias in the EurOccupations database. Special attention is paid to the aggregation level in which male- and female-dominated occupations are defined as well as the levels of skill and responsibility for male-and female-dominated occupations. For the EurOccupations extended list of approximately 1,500 occupations, we test whether the level of aggregation in which male- and female-dominated occupations are defined differs significantly. Additionally, for the 160 EurOccupations key occupations, we statistically test whether female-dominated occupations generally are of lower 'worth' than male-dominated occupations (i.e. have lower skill levels and lower levels of responsibility).

In this paper, we:

- assign measures of sex composition to the occupations in the EurOccupations database, using information from national Labour Force Surveys;
- check the number of male-dominated, female-dominated and mixed-sex occupations in the key and extended EurOccupations lists;
- test whether the occupational size (volume) differs significantly between the male-dominated, female-dominated and mixed-sex occupations in the key and extended EurOccupations lists;
- check, for the 160 EurOccupations key occupations, whether male-dominated occupations differ significantly from female-dominated occupations regarding relevant occupational dimensions comprising occupational 'worth' (skill level, responsibility).

This paper is presented and discussed in a research workshop during the EurOccupations final conference in Brussels / Leuven (23-24 April 2009).

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1. Introduction

How do occupations compare across countries? How can problems of incomparability of occupations be tackled? To answer these questions, 10 European universities and research institutes have joined their efforts to develop a European occupations database in the EU funded EurOccupations project. This occupations database includes approximately 1,500 of the most frequent occupations in 8 large EU member states, namely the United Kingdom, Germany, France, Spain, Poland, Belgium, the Netherlands and Italy. These occupations cover the whole range of industries, varying from care & welfare to technology & manufacturing, from service occupations to agriculture & fishing, etc. For the extended list of the 1,500 occupations, the EurOccupations database includes information concerning occupational title, ISCO-code and educational level. For a selection of 150 key occupations[1], the EurOccupations database additionally includes information on relevant occupational dimensions concerning occupational 'worth' (skill level, level of responsibility).

Please note that the EurOccupations project aims to develop a database of occupations, not jobs. The distinction between jobs and occupations is highly relevant. Occupations consist of similar sets of tasks that are performed independently of the corporate context. Jobs, on the other hand, are more detailed: they are comparable sets of tasks performed within a corporate context. The concept of occupation is especially relevant in comparative research, since studying jobs would limit generalisations to the corporate context and thus hamper international comparisons (Tomaskovic-Devey, 1995).

This paper describes how issues of gender bias may (have) affect(ed) the development of the EurOccupations occupations database. As research consistently shows, Western labour markets are strongly segregated by sex. Most occupations are either male- or female-dominated, the number of mixed-sex occupations is small. In most Western countries, female-dominated occupations can be found in sales, clerical and service work, while managerial and technical occupations are often male-dominated (e.g. De Ruijter, 2002; Birkelund and Sorenson, 2000; Grimshaw and Rubery, 1997). Due to the high level of sex segregation in the labour market, occupations are often associated with male and female stereotypes (e.g. Huffman and Velasco, 1997). This is often called 'gender bias' in the literature (see, e.g., Smit-Voskuijl, 1992; Tomaskovic-Devey, 1995). Research has shown time and time again that gender aspects play an important role in the definition, description and valuation of occupations and jobs. As a consequence, both national and international occupation databases and classifications are often not 'gender neutral' (e.g. Tijdens, 1990; De Ruijter, 2002; De Ruijter, 2005). Since 'gender bias' may also have affected the occupations database that was developed in the EurOccupations project, we explicitly address the issue of possible gender bias in the EurOccupations database in this paper.

How could this so called 'gender bias' have influenced the development of occupation classifications and occupation databases such as the EurOccupations database? First, research shows that gender bias appears in the level of aggregation with which occupations and jobs are defined (e.g. De Bruijn, 1996; Tijdens, 1990). Generally, the identification of female jobs and

[1] The EurOccupations team actively recruited experts for 150 'core' key occupations. Information was gathered for 10 additional key occupations as well, although without active expert recruitment. As a consequence, information about these 10 additional occupations may be lacking.

occupations is less specific and less differentiated compared to male jobs and occupations. This may have resulted in a relatively small number of female-dominated occupations in the EurOccupations database in comparison to the number of male-dominated occupations.

Second, female-dominated jobs and occupations are often valued lower than male-dominated occupations (De Bruijn, 1996; Peters et al., 1999; Van Doorne-Huiskes et al., 2001). Numerous studies show that both men and women attribute less 'worth' or value to work performed by women (e.g. England et al., 1994). For example, social skills, which are often considered as typical female, are frequently overlooked. Even though specific attention has been paid to the inclusion of typical female skills in the development of the EurOccupations database, it may be the case that in the resulting measurements of occupational 'worth', female-dominated occupations generally are assessed of lower 'worth' compared to male-dominated occupations.

This paper addresses the way gender bias might (have) influence(d) the EurOccupations database. We will investigate the following two ways in which the database may be biased:

1. level of aggregation: we will test whether the level of aggregation in which male- and female-dominated occupations are defined differs significantly in the EurOccupations occupations database by estimating the (relative) number of male-dominated, mixed-sex and female-dominated occupations and by analysing the occupational volume of these occupations;
2. occupational worth: we will statistically test whether female-dominated occupations in the EurOccupations key list of occupations generally are assessed in terms of lower 'worth'[2] compared to male-dominated key occupations (i.e. lower skill levels and levels of responsibility).

The plan of this paper is as follows. Section 2 describes the design of the EurOccupations occupations database and the expert research. Section 3 addressed possible gender bias in the level of aggregation. Section 4 describes the possible influence of gender bias in the EurOccupations measures of occupational 'worth'. Section 5 concludes this paper with a summary of main findings and conclusions.

[2] According to comparable worth researchers (e.g. England, 1992; Treiman and Hartmann, 1981), the 'worth' of occupations captures more than human capital proxies such as required education. They extend measures of required education and skill with measures of responsibility and effort. Occupational working conditions are sometimes also included in the definition of occupational worth (e.g. Treiman and Hartmann, 1981). However, the choice for working conditions that do or do not contribute to occupational worth is rather arbitrary, as this depends on the preferences of occupational workers (e.g. England, 1992). Instead of a characteristic of occupational worth, working conditions are assumed to be a characteristic of compensation, i.e. outcome-related instead of input-related.

2. The EurOccupations database

The extended list of 1,500 occupations

As was noted earlier, in the EurOccupations project, an extended list of occupations has been constructed including the most frequent occupations in Europe. The construction of this extended list of occupations as well as the selection of 150 key occupations is described in other EurOccupations research papers (Tijdens & Jacobs, 2006; De Ruijter, De Ruijter & Jacobs, 2008). In sum, the following steps were taken in the construction of this extended list of 1,500 occupations:

1. The ISCO08 (draft 3 version) list with its 447 occupations at 4-digit level was taken as the point of departure.
2. The 585 occupations at 4-digit level of the US-DOT classification at the proper 4-digit number were converted into the ISCO08 classification. All occupations, specified in US-DOT but not present in ISCO08, were added to the EurOccupations list.
3. Next, we went carefully through the extremely detailed list of 9,626 occupational titles of the ALPHABETICAL INDEX OF OCCUPATIONAL TITLES for ISCO88(COM). Occupations not yet present but that could be expected to have large numbers of job incumbents were added to the EurOccupations list.
4. Then, occupations often reported in the data of the WageIndicator web-survey, particularly from the German occupations list, were added to the EurOccupations list. This step allows for including new-arising occupations or for occupational titles that have to be detailed to a larger degree.
5. Finally, occupations not present yet in the Euroccupations list were added from national occupations classifications, notably the SBC classification from the Netherlands, the SOC (UK), the Belgian VDAB-lijst, the US O*Net occupations database (f.e. social workers), and the Canadian occupations website www.workfutures.bc.ca.

In total, a set of 1,432[3] unique occupational titles was created, classified according to the ISCO08 framework of 4-digit occupations (see www.euroccupations.org). For all of these occupations, the EurOccupations database includes information regarding occupational title, ISCO-code and educational level. In addition, the database includes information about distribution of gender, education and age groups in each country for aggregate groups of occupations.

Additional occupation information for a selection of key occupations: expert enquiry

For a selection of 150 key occupations, the EurOccupations database additionally includes information on occupational 'worth' (skill level and level of responsibility), occupational content and relevant social stratification measures (De Ruijter, De Ruijter & Veldhoen 2007). The key occupations have been selected from the EurOccupations extended list of occupations using several criteria. The following criteria were applied in the selection process:

- variation in skill level and ISCO major groups;

[3] Some occupational titles occur several times in the extended list (which is organised as a search tree) in order to enlarge the chance that respondents can find their occupation in the list. In total, the extended list comprises 1,531 entries.

- variation in gender composition (male-dominated, mixed, female-dominated occupations);
- the most frequent occupations (i.e., volume argument);
- 'blurred' occupations (e.g., managers, process operators, waiter).

This information on occupational 'worth' of these 150 key occupations was gathered by means of an expert enquiry in 2008, in which occupational experts were asked to judge occupations of their expertise on these occupational dimensions by completing one or more Internet questionnaire(s).

Expert definition:
Experts are expected to have knowledge about occupations or groups of occupations within the countries involved in EurOccupations.
Experts are: representatives of employers' or employees' organisations, professional organisations, interest groups, vocational training bodies or knowledge centres, supervisors, researchers in the field of occupations (either from universities or from statistical offices), informants from a wide variety of branches of industry, vocational advisors, HRD professionals etc.

For each key occupation, a questionnaire was designed in order to measure the relevant occupational characteristics. The English version of this questionnaire is included in Appendix A. The questionnaire includes questions concerning:

- occupational content and relevant tasks;
- skill level;
- required competencies;
- social stratification measures.

The table in Appendix B of this paper reports the responses of the expert Internet enquiry for the key occupations.

Addressing the issue of gender bias in the expert enquiry
It is important to note that, in the expert enquiry, we have specifically addressed the issue of gender bias (see De Ruijter, De Ruijter & Veldhoen 2007). For each key occupation, a set of 10-12 occupation-specific unique core tasks was described. In addition, relevant general competencies were identified for each key occupation using a general competency framework. By combining unique and 'rich' descriptions of tasks with a general set of competencies, we addressed the issue that female-dominated are often described in more general terms while male-dominated occupations are often described in a more specific manner (as described in Peters et al., 1999). Additionally, typical female competencies were included in the expert enquiry, as well as extensive measures of skill level (not focussing merely on formal educational entry requirements).

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3. Gender bias in the level of aggregation

In this section, we discuss the degree of gender bias in the EurOccupations occupations lists by analysing the level of aggregation in which occupations are defined. We first compare the (relative) number of male-dominated, mixed-sex and female-dominated occupations in both the EurOccupations key and extended list of occupations. Then, we will analyse the volume of these occupations, i.e. the share of the labour force employed in these male-dominated, mixed-sex and female-dominated occupations.

The (relative) number of male-dominated, mixed-sex and female-dominated occupations

Before we can address the question how many male-dominated, mixed-sex and female-dominated occupations are included in the EurOccupations database, we have to define when occupations are considered to be either male-dominated, mixed-sex or female-dominated. We consider an occupation to be numerically dominated by one sex if this sex is employed disproportionately in an occupation relative to the sex ratio of the total labour force. In the 6 countries for which data are available (all EurOccupations countries excluding Belgium and Italy), approximately 44% of the labour force was female. The percentage of women in the labour force per country is presented in Table 1. According to our definition, female-dominated occupations are those occupations with at least 25% more women than the total percentage of women in the labour force (total % women in labour force + 25%). Male-dominated occupations are those occupations with 25% less women than the total percentage of women in the labour force (total % women in labour force - 25%). We consider the remaining occupations to be of mixed sex.[4] Therefore, the definition of male-dominated, mixed-sex and female-dominated occupations differs between countries – depending on the total percentage of women in the labour force. The definitions per country are presented in Table 2.

Table 2 Participation of women in the labour force and definitions of the gender composition of occupations (for the six countries together and for each country separately)

			Definition gender composition occupations		
Country	**Number of women in labour force**	**% of women in labour force**	**male-dominated**	**mixed-sex**	**female-dominated**
Total[5]	54.278.545	44%	< 19% women	19 – 69% women	> 69% women
Germany	16.369.700	44%	< 19% women	19 – 69% women	> 69% women
Spain	6.206.895	38%	< 13%	13 - 63%	> 63%

[4] This definition closely resembles that of Jacobs and Steinberg (1995) and De Ruijter (2002). It is not static, but can vary according to the sex ratio of the labour force and the chosen 'boundaries'. Since most male- and female-dominated occupations are either strongly dominated by men or women, the choice for different boundaries does not make a large difference for the number of male- and female-dominated occupations one finds.

[5] Not controlled for country size.

			women	women	women
France	10.337.557	45%	< 20% women	20 – 70% women	> 70% women
The Netherlands	3.106.810	42%	< 17% women	17 – 67% women	> 67% women
Poland	6.043.247	46%	< 21% women	21 – 71% women	> 71% women
United Kingdom	12.214.336	46%	< 21% women	21 – 71% women	> 71% women

The table below presents the number of male-dominated, mixed-sex and female-dominated key occupations, based on calculations using the Eurostat LFS data for 2005 for ISCO 3-digit occupational groups. Please note that these numbers are a rough indication, since only labour force data on ISCO 3-digit occupational groups were available, which results in an overestimation of the number of mixed-sex occupations, given the fact that the degree of sex segregation is less pronounced in 3-digit occupations compared to, for example, 5-digit occupations, since more aggregate occupations often comprise both male- and female-dominated occupations and jobs (De Ruijter, 2002). Data were available for 6 EurOccupations countries, not including Italy and Belgium.

As one can observe, the number of male-dominated key occupations is high compared to the number of female-dominated key occupations. This holds for all 6 countries for which data on sex composition of the EurOccupations key occupations were available (although differences between the number of male-dominated key occupations and female-dominated occupations are relatively small in Spain and Poland). This indicates that, in the EurOccupations database, male-dominated occupations are specified on a more disaggregate level than female-dominated occupations. It is, however, difficult to draw conclusions based on this finding, since we only have data available on the % of women in the EurOccupations key occupations on the 3-digit ISCO level.

*Table 3 EurOccupations **key list occupations** by gender composition (for the six countries together and for each country separately)*

	Male-dominated occupations	**Mixed-sex occupations**	**Female-dominated occupations**	**Total**
TOTAL[6]				
Number of key occupations	49	74	37	160
% of key occupations	31%	46%	23%	100%
GERMANY				
Number of key occupations	54	58	33	145
% of key occupations	37%	40%	23%	100%
SPAIN				

[6] Not controlled for country size.

	Male-dominated occupations	Mixed-sex occupations	Female-dominated occupations	Total
Number of key occupations	36	92	32	160
% of key occupations	23%	58%	20%	100%
FRANCE				
Number of key occupations	55	68	27	160
% of key occupations	37%	45%	18%	100%
THE NETHERLANDS				
Number of key occupations	56	70	31	157
% of key occupations	36%	45%	20%	100%
POLAND				
Number of key occupations	47	67	40	154
% of key occupations	31%	44%	26%	100%
UNITED KINGDOM				
Number of key occupations	60	59	33	152
% of key occupations	40%	39%	22%	100%

Table 4 presents the number of male-dominated, mixed-sex and female-dominated occupations in the EurOccupations extended list of occupations, based on calculations using the Eurostat LFS data for 2005 for ISCO 1-digit occupational groups. These numbers are an even more rough indication compared to the numbers in Table 3, since only data on ISCO 1-digit occupational groups were available for the occupations in the extended list. This implies that the number of mixed-sex occupations in the database is severely overestimated. Nonetheless, Table 4 indicates that the number of female-dominated occupations in the extended list probably is lower compared to the number of male-dominated occupations in all countries.

*Table 4 EurOccupations **extended list occupations** by gender composition (for the six countries together and for each country separately)*

	Male-dominated occupations	Mixed-sex occupations	Female-dominated occupations	Total
TOTAL[7]				
Number of 1-digit ISCO occupations	3	5	2	10
Number of occupations in extended list	481	818	200	1499
% of occupations in	32%	55%	13%	100%

[7] Not controlled for country size.

	Male-dominated occupations	Mixed-sex occupations	Female-dominated occupations	Total
extended list				
GERMANY				
Number of 1-digit ISCO occupations	3	6	1	10
Number of occupations in extended list	481	921	97	1499
% of occupations in extended list	32%	61%	7%	100%
SPAIN				
Number of 1-digit ISCO occupations	1	9	0	10
Number of occupations in extended list	294	1205	0	1499
% of occupations in extended list	20%	80%	0%	100%
FRANCE				
Number of 1-digit ISCO occupations	2	6	2	10
Number of occupations in extended list	303	996	200	1499
% of occupations in extended list	20%	66%	13%	100%
THE NETHERLANDS				
Number of 1-digit ISCO occupations	3	7	0	10
Number of occupations in extended list	481	1018	0	1499
% of occupations in extended list	32%	68%	0%	100%
POLAND				
Number of 1-digit ISCO occupations	3	7	0	10
Number of occupations in extended list	481	1018	0	1499
% of occupations in extended list	32%	68%	0%	100%
UNITED KINGDOM				
Number of 1-digit ISCO occupations	4	4	2	10
Number of occupations in extended list	539	760	200	1499
% of occupations in	36%	51%	13%	100%

	Male-dominated occupations	Mixed-sex occupations	Female-dominated occupations	Total
extended list				

The volume of male-dominated, mixed-sex and female-dominated occupations

Another way in which gender bias might appear, is in the volume or size of the male-dominated, mixed-sex and female-dominated occupations in the EurOccupations database. As was noted earlier, prior research indicates that male-dominated occupations are often defined at a more specified and detailed level, therefore generally comprising fewer occupational workers compared to female-dominated occupations. To test whether this also holds for the occupations in the EurOccupations database, Table 5 presents the average volume of male-dominated, mixed-sex and female-dominated key list occupations.

As the table clearly indicates, the average number of employees in an occupation (the occupational volume) of female-dominated key occupations generally is, as one would expect, significantly larger compared to male-dominated and mixed-sex key occupations. Only in Spain and Poland, the average occupational volume of female-dominated key occupations is approximately the same as the average occupational volume of male-dominated key occupations. An interesting finding is that, generally, mixed-sex key occupations are relatively smaller in size compared to male-dominated key occupations (except for The Netherlands and the United Kingdom).

*Table 5 Average volume of the EurOccupations **key list occupations** by gender composition (for the six countries together and for each country separately)*

	Male-dominated occupations	Mixed-sex occupations	Female-dominated occupations
TOTAL[8]			
Number of occupations	49	74	37
Average occupational volume	1.835.213	1.385.721*	2.551.698**
GERMANY			
Number of occupations	54	58	33
Average occupational volume	591.707	373.033*	775.803**
SPAIN			
Number of occupations	36	92	32
Average occupational volume	346.295~	174.997*	347.907**
FRANCE			
Number of occupations	55	68	27
Average occupational volume	299.767	271.383*	720.189**

[8] Not controlled for country size.

	Male-dominated occupations	Mixed-sex occupations	Female-dominated occupations
THE NETHERLANDS			
Number of occupations	56	70	31
Average occupational volume	80.979	99.465	125.385**
POLAND			
Number of occupations	47	67	40
Average occupational volume	179.963	132.521*	176.176
UNITED KINGDOM			
Number of occupations	60	59	33
Average occupational volume	295.914~	429.850	832.102**

~ significant difference between male-dominated and other occupations (t-test, $p<0.05$)
* significant difference between sex-mixed and other occupations (t-test, $p<0.05$)
** significant difference between female-dominated and other occupations (t-test, $p<0.05$)

Due to the lack of adequate data concerning average occupational size for our extended list occupations, we cannot perform comparable analyses for the average volume of the EurOccupations extended list occupations by gender composition.

4. Gender bias in occupational 'worth'

In this section, we test whether the female-dominated key occupations are generally of lower value or 'worth' than the male-dominated key occupations in the EurOccupations database by systematically comparing and analysing the scores of male- and female-dominated occupations on the following three relevant occupation dimensions:

- skill level;
- level of responsibility;
- effort.

De Ruijter, De Ruijter & Veldhoen (2007) extensively describe how skill level, level of responsibility and effort are measured in the EurOccupations database for the 150 key occupations. For this paper, we suffice by pointing out that we will use the following EurOccuppations indicators to test whether the female-dominated key occupations generally are considered of lower value or 'worth' than male-dominated occupations:

Skill level:

- educational entry level according to the International Standard Classification of Education (ISCED);
- the average time to become competent in the occupation after completing the required formal education (varying from 1: up to 1 week to 7 ≥ 5 years).

Level of responsibility:

- supervision: average number of subordinates (varying from 1: none to 4: >100 employees).

Effort:

- required mental effort (varying from 1: not at all to 3: much);
- required physical effort (varying from 1: not at all to 3: much).

Educational entry level

Table 6 reports the average educational entry level of male-dominated, mixed-sex and female-dominated key occupations in the different countries.[9] The results reveal no significant differences in the educational level of female-dominated occupations compared to male-dominated or mixed-sex occupations. We do find that in Germany, the educational level of key occupations of mixed sex in general is higher compared to both male- and female-dominated key occupations. In Spain, male-dominated key occupations generally have a lower educational level than mixed-sex and female-dominated key occupations.

*Table 6 Average educational entry level (ISCED-classification) of the EurOccupations **key list occupations** by gender composition for the six countries*

	Male-dominated occupations	Mixed-sex occupations	Female-dominated occupations
GERMANY			

[9] It should be noted that information is available not for all key occupations in all countries (varying from information for 38 key occupations in Spain to 143 key occupations in the Netherlands).

	Male-dominated occupations	Mixed-sex occupations	Female-dominated occupations
Number of occupations	39	45	26
Average educational level (ISCED)	3.1	3.4*	3.1
SPAIN			
Number of occupations	7	23	8
Average educational level (ISCED)	2.1~	4.0	4.0
FRANCE			
Number of occupations	40	50	22
Average educational level (ISCED)	3.6	3.9	3.7
THE NETHERLANDS			
Number of occupations	49	65	29
Average educational level (ISCED)	3.0	3.2	3.0
POLAND			
Number of occupations	9	19	19
Average educational level (ISCED)	3.8	3.4	3.1
UNITED KINGDOM			
Number of occupations	53	54	31
Average educational level (ISCED)	2.2	2.6	2.1

~ significant difference between male-dominated and other occupations (t-test, $p<0.05$)
* significant difference between sex-mixed and other occupations (t-test, $p<0.05$)
** significant difference between female-dominated and other occupations (t-test, $p<0.05$)

The time to become competent in the occupation after completing the required formal education

After completing the required formal education, it generally takes some time before one becomes competent in an occupation. This also indicates the skill level of an occupation. The EurOccupations key occupations database also includes this indicator of skill level. Table 7 presents the time it takes to become competent in the occupation after completing the required formal education for male-dominated, mixed-sex and female-dominated key occupations in the different countries. The results indicate that in several countries, the skill level of female-dominated occupations generally is lower compared to male-dominated occupations: in France, the Netherlands, Poland and the United Kingdom, it often takes less time to become competent in female-dominated occupations compared to male-dominated occupations.

*Table 7 Average time it takes to become competent in the occupation after completing the required formal education (varying from 1: up to 1 week to 7 ≥ 5 years) of the EurOccupations **key list occupations** by gender composition for the six countries*

	Male-dominated occupations	Mixed-sex occupations	Female-dominated occupations

	Male-dominated occupations	Mixed-sex occupations	Female-dominated occupations
GERMANY			
Number of occupations	25	30	18
Average time to become competent (ordinal categories)	5.1	5.4	4.6
SPAIN			
Number of occupations	36	90	32
Average time to become competent (ordinal categories)	3.2	3.6*	3.1**
FRANCE			
Number of occupations	25	26	11
Average time to become competent (ordinal categories)	4.9	4.9	3.6**
THE NETHERLANDS			
Number of occupations	38	57	28
Average time to become competent (ordinal categories)	4.4	4.4	3.6**
POLAND			
Number of occupations	42	57	39
Average time to become competent (ordinal categories)	5.0~	4.7	4.1**
UNITED KINGDOM			
Number of occupations	57	55	32
Average time to become competent (ordinal categories)	5.2	5.7*	4.0**

~ significant difference between male-dominated and other occupations (t-test, $p<0.05$)
* significant difference between sex-mixed and other occupations (t-test, $p<0.05$)
** significant difference between female-dominated and other occupations (t-test, $p<0.05$)

Additionally, regression models are estimated in which we control for educational entry level. In this regression model, the average time to become competent in the occupation is the dependent variable. The independent variables are the average educational entry level and occupational sex composition. We added 2 dummy variables to the model in order to estimate the effect of sex composition: for mixed-sex and female-dominated occupations. Male-dominated occupations serve as the reference category.

The results in table 8 indicate that for female-dominated key occupations, the average time to become competent in the occupation is significantly lower compared to male-dominated occupations with comparable educational entry levels. This negative effect is significant in four out of six countries, namely France, the Netherlands, Poland and the United Kingdom.

*Table 8 Standardised coefficients of regression analyses, with the **average time to become competent in the occupation after completing the required formal education** of the EurOccupations key list occupations as the dependent variable*

	Germany	Spain	France	Netherlands	Poland	UK
Average ISCED	0.38**	0.55**	0.02	0.26**	0.14	0.25**
Male-dominated occupation	*Reference category*					
Mixed-sex occupation	-0.05	-0.03	0.04	-0.02	0.06	0.10
Female-dominated occupation	-0.20	-0.21	-0.27*	-0.18*	-0.45**	-0.36**
R^2	19%	30%	9%	10%	28%	26%

* p<0.10
** p<0.05

Supervision

The EurOccupations key occupations database also includes information concerning the average number of subordinates that people working in the occupation, in general, formally supervise. Table 9 reports the average number of subordinates of male-dominated, mixed-sex and female-dominated key occupations in the different countries. The analyses do not reveal any significant difference in the average number of subordinates between male- and female-dominated occupations. In the Netherlands and the United Kingdom, the average number of subordinates in the occupation is significantly higher for occupations of mixed-sex compared to both male- and female-dominated occupations. It is quite difficult to interpret this finding, since the mixed-sex occupations that are included in the analyses may in fact be either male- or female-dominated. As was noted earlier, due to the absence of detailed labour force data, the % women in 3-digit occupational categories was used as a proxy to measure the sex composition of the EurOccupations occupations, resulting in a severe overestimation of the number of occupations of mixed sex.

*Table 9 Average number of subordinates (varying from 1: none to 4: >100 employees) of the EurOccupations **key list occupations** by gender composition for the six countries*

	Male-dominated occupations	Mixed-sex occupations	Female-dominated occupations
GERMANY			
Number of occupations	25	29	14
Average number of subordinates (ordinal categories)	2.2	2.0	1.9
SPAIN			
Number of occupations	36	90	32
Average number of	2.0	2.1	2.0

	Male-dominated occupations	Mixed-sex occupations	Female-dominated occupations
subordinates (ordinal categories)			
FRANCE			
Number of occupations	34	37	16
Average number of subordinates (ordinal categories)	1.6	1.6	1.4
THE NETHERLANDS			
Number of occupations	39	59	29
Average number of subordinates (ordinal categories)	1.4~	1.8*	1.5
POLAND			
Number of occupations	41	58	37
Average number of subordinates (ordinal categories)	1.8	1.9	1.9
UNITED KINGDOM			
Number of occupations	55	53	32
Average number of subordinates (ordinal categories)	1.4	1.7*	1.4

~ significant difference between male-dominated and other occupations (t-test, p<0.05)
* significant difference between sex-mixed and other occupations (t-test, p<0.05)
** significant difference between female-dominated and other occupations (t-test, p<0.05)

Again, to analyse whether the average number of subordinates in male-dominated key occupations is significantly lower compared to female-dominated key occupations with comparable educational entry levels, regression models were estimated. The results are presented in the table below. The results underpin the findings in table 10, namely that in most countries, the average number of subordinated does not differ significantly between male- and female-dominated occupations. France is an exception: in France, the average number of subordinates is significantly lower in female-dominated occupations compared to male-dominated occupations with the same educational entry level.

*Table 10 Standardised coefficients of regression analyses, with the **average number of subordinates** of the EurOccupations key list occupations as the dependent variable*

	Germany	Spain	France	Netherlands	Poland	UK
Average ISCED	0.18	0.06	-0.08	0.10	-0.32**	0.12
Male-dominated occupation	*Reference category*					
Mixed-sex	-0.07	-0.13	-0.00	0.35**	0.15	0.33**

occupation						
Female-dominated occupation	-0.15	-0.18	-0.23*	0.11	-0.18	0.03
R^2	5%	2%	6%	11%	18%	13%

* p<0.10
** p<0.05

Physical effort

Comparable analyses are performed for the average required physical effort. The results for this occupation dimension are presented in table 11 (average scores) and table 12 (results of regression analyses). The average scores presented in table 11 indicate that in five out of six countries, the average required physical effort is significantly higher in male-dominated occupations compared to female-dominated occupations, namely in Spain, France, the Netherlands, Poland, and the United Kingdom

*Table 11 Average required physical effort (varying from 1: not at all to 3: much) of the EurOccupations **key list occupations** by gender composition for the six countries*

	Male-dominated occupations	**Mixed-sex occupations**	**Female-dominated occupations**
GERMANY			
Number of occupations	25	29	16
Average required physical effort (ordinal categories)	2.0	1.8	1.9
SPAIN			
Number of occupations	36	90	32
Average required physical effort (ordinal categories)	2.4~	1.8*	1.9
FRANCE			
Number of occupations	39	43	19
Average required physical effort (ordinal categories)	2.5~	1.8*	1.9
THE NETHERLANDS			
Number of occupations	47	63	30
Average required physical effort (ordinal categories)	2.3~	1.9*	2.1
POLAND			
Number of occupations	42	58	39
Average required physical effort (ordinal categories)	2.7~	2.3*	2.3
UNITED KINGDOM			

	Male-dominated occupations	Mixed-sex occupations	Female-dominated occupations
Number of occupations	57	55	32
Average required physical effort (ordinal categories)	2.5~	1.8*	1.8**

~ significant difference between male-dominated and other occupations (t-test, p<0.05)
* significant difference between sex-mixed and other occupations (t-test, p<0.05)
** significant difference between female-dominated and other occupations (t-test, p<0.05)

The finding that the male-dominated key occupations generally require more physical effort is underlined by the results of the regression analyses (see table 12): in France, the Netherlands, Poland and the UK, the amount of physical effort is significantly lower in female-dominated occupations compared to male-dominated occupations with comparable educational entry levels. We find that key occupations with higher educational entry levels generally require less physical effort compared to lower-level occupations. Interesting to note is that in Spain, we do not find a significant difference in required physical effort between male- and female-dominated occupations anymore once we control for educational entry level (which is due to the finding that, in Spain, the educational entry levels are significantly lower for male-dominated occupations compared to female-dominated occupations).

*Table 12 Standardised coefficients of regression analyses, with the **average required physical effort** of the EurOccupations key list occupations as the dependent variable*

	Germany	Spain	France	Netherlands	Poland	UK
Average ISCED	-0.08	-0.33*	-0.05	-0.19**	-0.26*	-0.32**
Male-dominated occupation	*Reference category*					
Mixed-sex occupation	-0.24	-0.20	-0.45**	-0.34**	-0.66**	-0.40**
Female-dominated occupation	-0.27	-0.12	-0.40**	-0.18*	-0.44**	-0.43**
R^2	7%	18%	22%	13%	25%	31%

* p<0.10
** p<0.05

Mental effort

Besides measures of physical effort, the database also includes measures of average mental effort for the EurOccupations key occupations. In table 13, the average required mental effort for male-dominated occupations, mixed-sex occupations and female-dominated occupations is presented for the six countries. The findings indicate that the required mental effort is significantly higher for mixed-sex occupations compared to both male- and female-dominated occupations in three countries, namely France, the Netherlands and the United Kingdom. There are almost no differences between male- and female-dominated occupations concerning degree of mental effort. This finding is underlined by the results of the regression analyses presented in table 14.

*Table 13 Average required mental effort (varying from 1: not at all to 3: much) of the EurOccupations **key list occupations** by gender composition for the six countries*

	Male-dominated occupations	Mixed-sex occupations	Female-dominated occupations
GERMANY			
Number of occupations	25	30	16
Average required mental effort (ordinal categories)	2.7	2.8	2.6
SPAIN			
Number of occupations	36	90	32
Average required mental effort (ordinal categories)	2.1	2.2	2.2
FRANCE			
Number of occupations	39	42	18
Average required mental effort (ordinal categories)	2.3~	2.7*	2.3
THE NETHERLANDS			
Number of occupations	40	60	30
Average required mental effort (ordinal categories)	2.3~	2.6*	2.4
POLAND			
Number of occupations	42	58	39
Average required mental effort (ordinal categories)	2.6~	2.8	2.8
UNITED KINGDOM			
Number of occupations	57	55	32
Average required mental effort (ordinal categories)	2.2~	2.6*	2.3

~ significant difference between male-dominated and other occupations (t-test, $p<0.05$)
* significant difference between sex-mixed and other occupations (t-test, $p<0.05$)
** significant difference between female-dominated and other occupations (t-test, $p<0.05$)

*Table 14 Standardised coefficients of regression analyses, with the **average required mental effort** of the EurOccupations key list occupations as the dependent variable*

	Germany	Spain	France	Netherlands	Poland	UK
Average ISCED	0.18	0.06	0.09	0.22*	0.14	0.27**
Male-dominated occupation	*Reference category*					

Mixed-sex occupation	0.06	0.39	0.46**	0.34**	0.40*	0.39**
Female-dominated occupation	0.02	0.25	0.02	0.16	0.17	0.07
R^2	4%	11%	22%	13%	11%	23%

* p<0.10
** p<0.05

5. Conclusion and discussion

This paper addressed the way gender bias might (have) influence(d) the EurOccupations database. We have investigate the following two ways in which the database may be biased:

1. level of aggregation;
2. measures of occupational worth.

Gender bias in the level of aggregation

First of all, gender bias may occur in the level of aggregation in which male- and female-dominated occupations are defined. Generally, the identification of female occupations is less specific and less differentiated compared to male occupations. This may have resulted in a) a relatively small number of female-dominated occupations in the EurOccupations database compared to the number of male-dominated occupations and b) a larger volume or occupational size of female-dominated occupations compared to male-dominated occupations.

Analyses indicate that male-dominated occupations indeed appear to be specified on a more disaggregate level than female-dominated occupations in the EurOccupations key and extended list of occupations. Additionally, analyses of the average occupational size indicate that, as one would expect, the average number of employees in an occupation generally is larger in female-dominated occupations compared to male-dominated and mixed-sex key occupations. These findings indicate that gender bias might play a role in the EurOccupations lists of occupations.

Gender bias in occupational worth

Additionally, this paper investigated the question whether female-dominated occupations in the EurOccupations key list of occupations generally are assessed in terms of lower 'worth' compared to male-dominated key occupations. In order to address this question, the scores of male- and female-dominated occupations on the following relevant occupation dimensions were systematically compared:

- skill level (educational entry level and the time it takes to become competent after completing the required formal education);
- level of responsibility (average number of subordinates);
- mental and physical effort.

The results of the analyses presented in this paper indicate that male-dominated occupations in the EurOccupations key list generally are of higher 'worth' for the following two measures:

- the average time to become competent in the occupation;
- physical effort.

For the other dimensions of occupational 'worth' for which analyses were performed (educational entry level, number of subordinates, mental effort), no significant differences were found between male- and female-dominated occupations.

Important reservation

It should be noted that it is quite difficult to draw straightforward conclusions on the role of gender bias in the EurOccupations database based on the analyses presented in this paper, since the % of women in 3-digit and 1-digit ISCO occupational groups had to be used as a proxy for the sex composition of the 1,500 detailed occupations in the EurOccupations database. The lack of detailed measures of occupational sex composition seriously hampers the analyses of possible gender bias in occupation databases, since the use of these aggregate measures results in a severe overestimation of the number of occupations of mixed sex. Therefore, it is difficult to draw sound conclusions on the influence of gender bias, both concerning the level of aggregation in which occupations are defined as well as in measures of occupational worth.

Therefore, in future surveys, it is important to gather data on a more detailed occupational level so that more accurate measures of occupational sex composition can be calculated. For this purpose, the EurOccupations extended list of occupations can be used as a tool to measure the occupation variable in Internet surveys. This information can be used to provide more accurate measures of occupational sex composition for all 1,500 occupations in the extended list. Once these measures are available, the analyses that are presented in this paper should be replicated in order to draw more sound conclusions about the role of gender bias in the EurOccupations database.

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Appendix A English version of expert questionnaire on key occupations in the EurOccupations database

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EXPERT QUESTIONNAIRE KEY OCCUPATION [OCCUPATIONAL TITLE]

This questionnaire includes questions on the content of the occupation [insert occupational title]. Some questions might be difficult to answer. If you do not know the answer to certain questions, you can mark the box 'I don't know'.

Short description of the occupation

[Insert short description]

1. Do you currently work in this occupation?

☐ Yes
☐ No

2. If any, what alternative job titles are used in your country for [insert occupational title] (max. of 3 job titles, please include those most frequently used)?

1.....
2.....
3.....

Below, the main tasks of this occupation are suggested. Please note that these task descriptions are preliminary. They are based on international deskresearch. You are more than welcome to provide comments and suggestions to revise the task list.

Suggested tasks:

1. [Insert task 1]
2. [Insert task 2]
3. [Insert task 3]
4. [Insert task 4]
5. [Insert task 5]
6. [Insert task 6]
7. [Insert task 7]
8. [Insert task 8]
9. [Insert task 9]
10. [Insert task 10]
11. [Insert task 11]
12. [Insert task 12]

3. Are any key tasks missing in the task list?

1.....
2.....
3.....

Room for comments on the task list

.....
.....

…… …… …… …… ……

4. Could you indicate for each of the tasks how frequently the task is performed (never or on a daily, weekly, monthly or yearly basis)?

	Never	Yearly	Monthly	Weekly	Daily	I don't know
1. [Insert task 1]	☐	☐	☐	☐	☐	☐
2. [Insert task 2]	☐	☐	☐	☐	☐	☐
3. [Insert task 3]	☐	☐	☐	☐	☐	☐
4. [Insert task 4]	☐	☐	☐	☐	☐	☐
5. [Insert task 5]	☐	☐	☐	☐	☐	☐
6. [Insert task 6]	☐	☐	☐	☐	☐	☐
7. [Insert task 7]	☐	☐	☐	☐	☐	☐
8. [Insert task 8]	☐	☐	☐	☐	☐	☐
9. [Insert task 9]	☐	☐	☐	☐	☐	☐
10. [Insert task 10]	☐	☐	☐	☐	☐	☐
11. [Insert task 11]	☐	☐	☐	☐	☐	☐
12. [Insert task 12]	☐	☐	☐	☐	☐	☐
13. …… ……	☐	☐	☐	☐	☐	☐
14. …… ……	☐	☐	☐	☐	☐	☐
15. …… ……	☐	☐	☐	☐	☐	☐

5. How important is competent performance of this task in this occupation?

	Not at all important	Of some importance	Of major importance	I don't know
1. [Insert task 1]	☐	☐	☐	☐
2. [Insert task 2]	☐	☐	☐	☐
3. [Insert task 3]	☐	☐	☐	☐
4. [Insert task 4]	☐	☐	☐	☐
5. [Insert task 5]	☐	☐	☐	☐
6. [Insert task 6]	☐	☐	☐	☐
7. [Insert task 7]	☐	☐	☐	☐
8. [Insert task 8]	☐	☐	☐	☐
9. [Insert task 9]	☐	☐	☐	☐
10. [Insert task 10]	☐	☐	☐	☐
11. [Insert task 11]	☐	☐	☐	☐
12. [Insert task 12]	☐	☐	☐	☐
13. …… ……	☐	☐	☐	☐
14. …… ……	☐	☐	☐	☐
15. …… ……	☐	☐	☐	☐

6. What is the <u>required</u> educational entry level for this occupation in your country? Please note that the required educational entry level may differ from the average educational level of the people working in an occupation. We ask you to tick the <u>required</u> educational entry level. You can mark more than 1 box.

☐ *[insert country-specific education categories]*
☐
☐
☐
☐
☐
☐
☐
☐
☐

7a. Are there additional formal or legal requirements for this occupation?

- ☐ Yes, namely:
  - ☐ diploma (full educational programme) → *question 7b*
  - ☐ certification (training / course) → *question 7c*
  - ☐ working according to a professional code or protocol → *question 7d*
  - ☐ other, please specify ..... → *question 7e*
- ☐ No → *question 8*
- ☐ I don't know

7b. How are the additional *diploma requirements* established/laid down?

- ☐ collective labour agreement
- ☐ law/legal requirement
- ☐ federal government
- ☐ branch of industry
- ☐ other, please specify.....
- ☐ I don't know

7c. How are the additional *certification (training/course) requirements* established/laid down?

- ☐ collective labour agreement
- ☐ law/legal requirement
- ☐ federal government
- ☐ branch of industry
- ☐ other, please specify.....
- ☐ I don't know

7d. How are the additional *professional code or protocol requirements* established/laid down?

- ☐ collective labour agreement
- ☐ law/legal requirement
- ☐ federal government
- ☐ branch of industry
- ☐ other, please specify.....
- ☐ I don't know

7e. How are the additional *other requirements* established/laid down?

- ☐ collective labour agreement
- ☐ law/legal requirement
- ☐ federal government
- ☐ branch of industry
- ☐ other, please specify.....
- ☐ I don't know

8. We want to know more about the transferability of skills. Therefore, we would like to know the relevance of the competencies mentioned below for this occupation.[10]

		Not at all important	Of some importance	Of major importance	I don't know
A	Initiating action	☐	☐	☐	☐
B	Instructing co-workers	☐	☐	☐	☐
C	Supervising	☐	☐	☐	☐
D	Co-operating with colleagues	☐	☐	☐	☐
E	Communicating	☐	☐	☐	☐
F	Relating and networking	☐	☐	☐	☐
G	Negotiating	☐	☐	☐	☐
H	Reporting	☐	☐	☐	☐
I	Applying know-how, professional expertise	☐	☐	☐	☐
J	Problem solving	☐	☐	☐	☐
K	Developing new procedures and working methods	☐	☐	☐	☐
L	Forming strategies	☐	☐	☐	☐
M	Planning and organising	☐	☐	☐	☐
N	Following instructions and procedures	☐	☐	☐	☐
O	Dealing with contingencies	☐	☐	☐	☐
P	Coping with stressful situations	☐	☐	☐	☐
Q	Commercial thinking	☐	☐	☐	☐

9. Do you expect the size of this occupation (how many people are working in the occupation) to decline, increase or remain stable in the next 5 years?

☐ Declining occupation size
☐ Stable occupation size
☐ Increasing occupation size
☐ I don't know

[10] The list of competencies is based on the SHL Competency Framework (Bartram, D. (2005). The great eight competencies: A criterion-centric approach to validation. *Journal of Applied Psychology*, 90 (6): 1185-1203).

10. Do you have any additional comments?

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Thank very much for your time and effort!

Part 1 of the questionnaire is now completed. We would like to ask whether you are willing to answer some additional questions concerning, for instance, the effort required to perform the occupation, relevant developments etc. Your cooperation will be highly valued.

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PART 2 EXPERT QUESTIONNAIRE (OPTIONAL)

11. How many subordinates do people working in this occupation, in general, formally supervise (*EXCLUDING* the coaching of less experienced co-workers, students or trainees)?

- ☐ none
- ☐ 1 – 10 employees
- ☐ 11 – 100 employees
- ☐ > 100 employees
- ☐ I don't know

12. How often does the work involve coaching or training of less experienced co-workers, students or trainees (*EXCLUDING* the subordinates that are formally supervised)?

- ☐ Regularly
- ☐ Occasionally
- ☐ Never
- ☐ It varies
- ☐ I don't know

13. How much physical effort is generally required in this occupation?

- ☐ Not at all
- ☐ Some
- ☐ Much
- ☐ I don't know

14. How much mental effort is generally required in this occupation?

- ☐ Not at all
- ☐ Some
- ☐ Much
- ☐ I don't know

15. Is organising part of the work in this occupation?

- ☐ Yes, it involves the organisation of personnel/staff
- ☐ Yes, it involves the organisation of equipment/material
- ☐ Yes, it involves the organisation of both personnel/staff and equipment/material
- ☐ No
- ☐ I don't know

16. Which of these categories best describes the use of computers required in this occupation?

- ☐ Not at all
- ☐ Routine (e.g., word processing, spreadsheets and/or e-mail)
- ☐ Complex (e.g., for gathering/analysing information, design)
- ☐ Advanced (e.g., programming, IT development)
- ☐ I don't know

17. When can people start working in this occupation?

- ☐ Immediately after completing formal education
- ☐ Via in-company dual-learning trajectories after completing formal education
- ☐ Via apprenticeships
- ☐ Other, namely……
- ☐ I don't know

18. How long does it generally take, after completing the required formal education, to become competent in this occupation?

- ☐ Up to 1 week
- ☐ 1 week – 1 month
- ☐ 1 – 3 months
- ☐ 3 – 6 months
- ☐ 6 months – 1 year
- ☐ 1 – 5 years
- ☐ ≥ 5 years
- ☐ I don't know

19. How often do people working in this occupation have to update their knowledge and skills?

- ☐ Never
- ☐ Yearly
- ☐ Monthly
- ☐ Weekly
- ☐ Daily
- ☐ I don't know

20. Are you familiar with the European Qualification Framework?

- ☐ Yes → *go to question 21*
- ☐ No → *go to question 24*

21. Which of the following descriptions characterises the level of knowledge of this occupation best?[11] Tick one box only. *If you do not know the answer to this question, you can select the box 'I don't know'.*

This occupation requires:

- ☐ … basic general knowledge
- ☐ … basic factual knowledge of a field of work
- ☐ … knowledge of facts, principles, processes and general concepts, in a field of work
- ☐ … factual and theoretical knowledge in broad contexts within a field of work
- ☐ … comprehensive, specialised, factual and theoretical knowledge within a field of work and an awareness of the boundaries of that knowledge
- ☐ …. advanced knowledge of a field of work, involving a critical understanding of theories and principles
- ☐ … highly specialised knowledge of a field of work and critical awareness of knowledge issues in a field and at the interface between different fields
- ☐ … knowledge at the most advanced frontier of a field of work and at the interface between fields
- ☐ I don't know

22. Which of the following descriptions characterises the skill level of this occupation best?[12] Tick one box only. *If you do not know the answer to this question, you can select the box 'I don't know'.*

Definition:

Cognitive skills: use of logical, intuitive and creative thinking

Practical skills: involving manual dexterity and the use of methods, materials, tools and instruments

This occupation requires:

- ☐ … basic skills required to carry out simple tasks
- ☐ … basic cognitive and practical skills required to use relevant information in order to carry out tasks and to solve routine problems using simple rules and tools
- ☐ … a range of cognitive and practical skills required to accomplish tasks and solve problems by selecting and applying basic methods, tools, materials and information
- ☐ … a range of cognitive and practical skills required to generate solutions to specific problems in a field of work
- ☐ … a comprehensive range of cognitive and practical skills required to develop creative solutions to abstract problems
- ☐ … advanced skills, demonstrating mastery and innovation, required to solve complex and unpredictable problems in a specialised field of work
- ☐ … specialised problem-solving skills required in research and/or innovation in order to develop new knowledge and procedures and to integrate knowledge from different fields
- ☐ … the most advanced and specialised skills an techniques, including synthesis and evaluation, required to solve critical problems in research and/or innovation and to extend and redefine existing knowledge or professional practice
- ☐ I don't know

23. Which of the following descriptions characterises the level of responsibility and

[11] This question is based on the European Qualification Framework.
[12] This question is based on the European Qualification Framework.

autonomy of this occupation best?[13] **Tick one box only.** *If you do not know the answer to this question, you can select the box 'I don't know'.*

This occupation involves:

- ☐ … working under direct supervision in a structured context
- ☐ … working under supervision with some autonomy
- ☐ … taking responsibility for completion of tasks and adapting own behaviour to circumstances in solving problems
- ☐ … exercising self-management within the guidelines of work contexts that are usually predictable, but are subject to change and supervising the routine work of others, taking some responsibility for the evaluation and improvement of work activities
- ☐ … exercising management and supervision in work contexts where there is unpredictable change and review and develop performance of self and others
- ☐ … managing complex technical or professional activities or projects, taking responsibility for decision-making in unpredictable work contexts and taking responsibility for managing professional development of individuals and groups
- ☐ … managing and transforming work contexts that are complex, unpredictable and require new strategic approaches and taking responsibility for contributing to professional knowledge and practice and/or for reviewing the strategic performance of teams
- ☐ … demonstrating substantial authority, innovation, autonomy, scholarly and professional integrity and sustained commitment to the development of new ideas or processes at the forefront of work contexts including research
- ☐ I don't know

We now want to ask some questions about expected changes and developments in the occupation.

24. Do you expect the content of this occupation to change within the next 5 years?

- ☐ Yes, in the following way:……
  ……..
- ☐ No
- ☐ I don't know

25. Do you expect the educational requirements for this occupation to change within the next 5 years?

- ☐ Yes, in the following way: ……
  ……..
- ☐ No
- ☐ I don't know

26. In your country, is the occupation typically performed in: (you can mark more than 1 box)

- ☐ Small organisations and firms (≤ 10 employees)
- ☐ Medium-sized organisations and firms (11 – 100 employees)
- ☐ Large organisations and firms (> 100 employees)
- ☐ I don't know

[13] This question is based on the European Qualification Framework.

27. In your country, is this occupation typically carried out in the public or private sector?

- ☐ Public sector
- ☐ Private sector
- ☐ Both
- ☐ I don't know

28. Do you have any additional comments?

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Thanks very much for your time and effort!!!

EurOccupations.org

Appendix B Response numbers of the EurOccupations expert Internet enquiry for key occupations in the 8 participating countries

Occupation	BE	SP	FR	GE	IT	NL	PO	UK	Total
Ambulance attendant		2	2	2		1	3	1	11
Carer for the disabled	2	3	1	2		2	7	2	19
Carer for the elderly	3	2	2	5		2	5		19
Charge nurse		2	2	3		2	7		16
Community or social service worker	4	2	2	3		5	7		23
Dental hygienist		3				1	3	1	8
Dental prosthesis technician	1		2	1		4	3		11
Dietician	3	3	2	3		11	4		26
General Practitioner GP	1	2	3	3		4	3	1	17
Health service manager		2	2	2		1	1	1	9
Hospital nurse	2	5	5	9		4	14	1	40
Medical laboratory technician	2	2	2	2		5	1		14
Midwifery professional	2	2	4	4		10	7	4	33
Nursing aid	1	2	2	1		2	4		12
Optician		2	2	1		3	3		11
Personal carer in private homes	3	2	3	2		3	3		16
Personal carer instit elderly	5	2	2	2		3	3		17
Personal carer instit handicapped		2	4	2		3	3		14
Physician assistant		2		3		2	3	2	12
Scanning equipment operator	2	3	3	2		4	1		15
Surgeon		2	2	5		4	3		16
Administrative services department manager		2	3	9		3	6	3	26
Cashier	1	2	2	1		3	5		14
Company director, chief executive 10-50 employees	2	2	2	4		4	5	1	20
Doorkeeper, concierge		2	2	1		2	4	2	13
Executive secretary	8	2	9	1	2	5	4	3	34
Filing clerk	2	2	2			3	3	2	14
Fire fighter	2	2	3	2		5	3		17
Human Resource manager	1	3	3	5		10	6	4	32
Legal secretary		2	2	1		2	4	1	12
Local police officer	2	2	2	2	1	2	5	1	17
Logistics manager		3	2	2		3	4	3	17
Non-commissioned officer armed forces	1	2	3	1		2	4	1	14
Payroll clerk	3	2	3	2		3	6	1	20

Police inspector	1	2	4	5		1	5	2	20
Post sorting or distributing clerk	1	2	2	4		3	3	1	16
Receptionist	8	2	2	2		3	5	1	23
Seaman, military operations crew member		2		1	1		2	1	7
Secretary (general)	5	6	7	4		7	12	6	47
Security guard	2	2	2	3		16	3		28
Soldier, military operations crew member	2	2	2	2		1	1	2	12
Building architect	1	3	2	2	1	3	3	1	16
Building construction helper		3	2		1	2	3	1	12
Building structure engineer		3	1	3	1	2	5	1	16
Car mechanic	4	3	4	2	1	6	10	5	35
Carpenter	1	2	3	3	1	3	4	1	18
Civil engineering technician		4	2	4	1	1	3	1	16
Climatologist / metereologist	3	2	2	3	1	4	3		18
Concrete steel worker	1	3	2	2		3	2	1	14
Construction bricklayer	1	4	5	3		6	3	1	23
Electrical engineer		2	3	2		92	5		104
Electrical mechanic or fitter	2	2	1	4	1	4	4		18
First line supervisor mechanics, installers, or repairers	1	2	1	2	2	3	5	1	17
Garage supervisor		2	1	1	1	5	3		13
House painter	1	3	2	2		8	3		19
Interior decorator		3	2	1		2	3		11
Master technician cars	1	3	2	1		3	3	1	14
Mechanical engineering technician		1			1	1	3		6
Plumber	1	3	2	6		3	2		17
Refrigeration or air-conditioning equipment erector	1	4	2	2	1	2	3	2	17
Refrigeration or air-conditioning equipment mechanic	1	4	2	2		1	2	1	13
Road paviour, jack hammer operator		3	2	2		13	4		24
Roofer	1	3	3	2		5	3		17
Roofer bituminous operator	1	3	2	2		2	2	1	13
Tile setter, tile layer	1	2	2	4		3	2		14
Child care service manager	1		1	1		1	5	1	10
child carer	2	3	2	2		3	4	1	17
Education advisor	1	3	2	6		6	7	3	28
Nursery school teacher		2	2	1		2	3		10
Personnel clerk	3	2	1	2		9	17	1	35
Post-secondary education teacher	4	2	3	3		5	3	3	23
Primary school principal		2	3	1		7	3		16

Primary school teacher	1	2	5	1		6	4	1	20
Psychologist		6	6	6		52	14	3	87
Secondary education teacher	2	3	3	3		8	5	2	26
Secondary school principal	1	2	3	2		3	3		14
Speech therapist	2	2	3	10		2	3		22
University professor	3	2	5	2		4	3	6	25
University researcher	6	3	3	3		7	3	9	34
Vocational education teacher	2	4	4	3		12	3	1	29
Accountant	1	2	3	8		4	7	2	27
Bank clerk		3	3	5	1	4	3		19
Database designer	1	3	2	2	1	4	3	2	18
Estate agent	1	6	4	3		5	7	1	27
Financial clerk	1	2	2	3		2	4	2	16
Financial institution branch manager		3	2	2		3	3	1	14
IT applications programmer	1	3	2	5		4	4	4	23
IT systems administrator	1	3	2	12	1	3	4	2	28
Journalist		2	2	6		2	3	2	17
Judge		2	2	2		3	3	1	13
Lawyer	3	2	2	1		1	4	1	14
Marketing manager		3	2	3		5	4	6	23
Mortgage clerk		2	3	2		3	4		14
Musical instrument maker		2					1		3
Policy adviser	2	2	1	5	1	5	3	3	22
Portrait, wedding or other events photographer	1	3	2	3		2	3	1	15
Printing machine operator	2	4	2	4		3	3	2	20
Tax inspector	1	2	2	3		1	2	1	12
Telecommunication equipment installer or repairer		3	1				3		7
Web designer		3	2	3		3	3	4	18
Aircraft mechanic or service technician		2	1	3		3	3	1	13
Assembling helper	1	2	1			3	3		10
Beverage production process operator	1	3	2	3		1	1	5	16
Boring machine operator	1	2	1	2			4		10
CNC operator	2	2	2	2		4	3		15
Confectionery maker	1	3	1	3		1	3	1	13
First line supervisor assembly line workers		1					3		4
First line supervisor manufacturing workers		3	2			1	3	2	11
Lathe or turning machine tool setter-operator		3	1	2			3		9
Machine tool operator	1	2	1	2		1	3		10

Meat processing machine operator	1	3	1	2			1	1	9
Metal molder or metal molding machine setter-operator		3	1	2			3		9
Metal production process operator	1	3	1	2		2	3		12
Pipe fitter	2	2	1	3			3	1	12
Plant maintenance mechanic		1		1		2	1		5
Power production plant operator		2	1	2		2	3	1	11
Quality assurance inspector		2	2	2		2	2	1	11
Sewer, seamstress	6	6	3	4		4	9	4	36
Sheet-metal worker		2	2	2			5		11
Welder	3	2	3	2		4	4		18
Wood processing plant operator	2	2	2	2		1	1	2	12
Agricultural advisor	1	2	2	2		2	2	1	12
Beautician	1	3	2	2		3	3	4	18
Butcher or fishmonger in retail		3	2	3		2	3		13
Department store manager		4	2	2		3	7	2	20
Display decorator		3	3	2		2	3	1	14
Field crop or vegetable grower		2	2	2		2	5	1	14
First line supervisor landscaping, lawn service, or groundskeeping workers	1	3	2	3		3	1	1	14
Florist	1	3	3	2		2	3	2	16
Food science technician	1	2	1	2		1	3	4	14
Gardener		2	2	3		4	1	1	13
Hairdresser	2	5	3	7		3	10	4	34
Horse riding instructor		2	2	2		4	2	1	13
Inland waters fisherman		2		2		2	3	1	10
Livestock farm helper		2	2			3	3	1	11
Mixed crop farm manager	1	2	2	2		3	4	1	15
Non-farm animal caretaker	2	2	1	1		5	3	1	15
Sales clerk	2	2	3	7		4	4	1	23
Sales representative other products	2	2	1	2		6	5	2	20
Shoemaker, leather repairer	1	2	3	2	1	2	3	1	15
Shop sales assistant	1	4	2	6		3	7	1	24
Surgical footwear maker		2					1		3
Vermin control worker		1					1		2
Veterinarian		2	3	15		3	3	4	30
Cloak room attendant		2					3		5
Flight attendant		4	2	12		2	4	4	28
Hotel manager		3	2	2	1	3	4	1	16
International truck driver	2	2	2	2	1	7	4	2	22
Kitchen helper	2	2	2	2		2	3		13
Restaurant cook	3	2	3	4		5	4		21
Sailor	1	2	2	3		1	3	4	16

Ship mechanic	2	2	1	3		2	3		13
Swimming instructor	1	7	4	5	1	35	7	2	62
Taxi driver		2	2	14		4	4	3	29
Transport clerk	2	2	2	3		4	1	2	16
Travel agency clerk	3	2	2	4	1	1	3		16
Waiter or waitress	5	4	2	3		3	3	1	21
Asbestos removal worker	5	3	2	3		3	4	3	23
Cleaner in offices, schools or other establishments	2	2	2	2		4	4	2	18
First line supervisor cleaning workers	1	2	2	2		5	3	1	16
Total	204	404	345	456	26	690	613	211	2949