OECD Social, Employment and Migration Working Papers
No. 294

The demand for language skills in the European labour market: Evidence from online job vacancies

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https://dx.doi.org/10.1787/e1a5abe0-en

OECD

Organisation for Economic Co-operation and Development

DELSA/ELSA/WD/SEM(2023)12

Unclassified **English text only**

13 June 2023

DIRECTORATE FOR EMPLOYMENT, LABOUR AND SOCIAL AFFAIRS
EMPLOYMENT, LABOUR AND SOCIAL AFFAIRS COMMITTEE

The demand for language skills in the European labour market: Evidence from online job vacancies

OECD SOCIAL, EMPLOYMENT AND MIGRATION WORKING PAPERS No. 294

JEL Classification: J20, J24, R10

Authorised for publication by Stefano Scarpetta, Director, Directorate for Employment, Labour and Social Affairs.

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This working paper was prepared in the framework of the OECD Skills Outlook 2023, supported by the European Commission through the Erasmus+ programme.

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JT03521816

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Acknowledgements

This working paper was prepared within the framework of the OECD Skills Outlook 2023, supported by the European Commission through the Erasmus+ programme. The opinions expressed and arguments employed herein do not necessarily reflect the official views of the OECD member countries or the European Union.

The authors would like to thank Alexandros Bitoulas, Jiri Branka, Tiago Fragoso, Vladimir Kvetan, Lars Ludorph, Fabio Manca, El Iza Mohamedou, Anca Nagy, Joanna Napierala, Marco Paccagnella, Raquel Paulino, Fernando Reis, Alessio Tomelleri, Jun Yu, Quentin Vidal and OECD colleagues from the Centre for Skills for useful comments on the paper as well as Jennifer Cannon and Duniya Dedeyn for their administrative and editorial work.

Abstract

This paper investigates the demand for language skills using data on online job vacancies in 27 European Union member countries and the United Kingdom in 2021. Evidence indicates that although Europe remains a linguistically diverse labour market, knowing English confers unique advantages in certain occupations. Across countries included in the analyses, a knowledge of English was explicitly required in 22% of all vacancies and English was the sixth most required skill overall. A knowledge of German, Spanish, French and Mandarin Chinese was explicitly demanded in between 1% and 2% of all vacancies. One in two positions advertised on line for managers or professionals required some knowledge of English, on average across European Union member countries and across OECD countries in the sample. This compares with only one in ten positions for skilled agricultural, forestry and fishery workers and among elementary occupations.

Résumé

Le présent rapport analyse la demande de compétences linguistiques en s'appuyant sur les données relatives aux offres d'emploi en ligne publiées dans 27 pays membres de l'Union européenne et au Royaume-Uni en 2021. Il apparaît que même si le marché du travail européen se caractérise toujours par une grande diversité linguistique, la connaissance de l'anglais confère des avantages spécifiques dans certaines professions. Dans l'ensemble des pays considérés, la connaissance de l'anglais était explicitement requise dans 22 % des offres d'emploi et, dans l'ensemble, l'anglais constituait la sixième compétence la plus demandée. La connaissance de l'allemand, de l'espagnol, du français et du mandarin était explicitement requise dans 1 à 2 % des offres d'emploi. En moyenne, dans les pays membres de l'Union européenne et dans les pays de l'OCDE faisant partie de l'échantillon, une offre d'emploi en ligne sur deux pour des postes de cadres ou de travailleurs intellectuels exigeait une certaine maîtrise de l'anglais. À titre de comparaison, l'anglais n'était exigé que dans un poste sur dix concernant les ouvriers qualifiés de l'agriculture, de la sylviculture et de la pêche et les professions élémentaires.

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1. Introduction

1. Language is a key component of identity (Della Chiesa, Scott and Hinton, 2012[1]; Tabouret-Keller, 2017[2]). As such, language has an important social value, notably due to its role in determining whether an individual belongs to a specific cultural group. This can confer economic advantages (or disadvantages, for example if some stigma is associated to the social group) in terms of social capital and networking opportunities. Language also has a transactional value: individuals, firms, and organisations use language to communicate with one another to exchange information, goods, and services. Transaction costs associated with trade are rapidly decreasing because of the wide availability of affordable information and communication technology (ICT) and speed of transportation (Hummels, 2007[3]). However, language – a medium through which trade between different agents occurs – remains an important facilitator and barrier to both trade (Melitz, 2008[4]) and mobility (Isphording and Otten, 2014[5]; Ovchinnikova, Mol and Jones, 2022[6]). Although human translators and interpreters as well as AI-machine translators can help individuals and firms overcome linguistic barriers (Borgonovi, Hervé and Seitz, 2023[7]), their value lies primarily when individuals are confronted with written text whereas language skills allow individuals to easily communicate also orally.

2. Language proficiency is a form of human capital. The returns to language proficiency in labour markets tend to increase with the number of speakers, vary depending on contextual factors, other forms of human capital individuals possess and the unique combination between individual and contextual circumstances (Chiswick and Miller, 2003[8]; Chiswick and Miller, 1995[9]). Factors that shape the development of language proficiency among individuals include availability of high-quality and affordable formal and informal learning opportunities, the ease with which developing proficiency occurs – which is a function of cultural and linguistic proximity (Borgonovi and Ferrara, 2020[10]; OECD, 2018[11]), the age at which learning occurs (Chiswick and Miller, 1995[9]; Guven and Islam, 2015[12]), and the economic and social returns associated with gaining proficiency.

3. A large literature has examined the labour market returns associated with the development of language skills among migrant communities. Such literature has identified large returns for immigrant communities associated with acquiring the language spoken in the host country (Bleakley and Chin, 2004[13]; Chiswick and Miller, 1995[9]; Dustmann and Fabbri, 2003[14]; Dustmann and Soest, 2001[15]). However, the benefits of language proficiency, defined in this work as the ability to communicate effectively in more than one language extend also to non-migrant communities. This is especially the case in Europe, a large, linguistically diverse community of more than 500 million people and 24 official languages in which, thanks to the European Common market, the free movement of goods, capital, services, and people is guaranteed. According to the Council of the European Union "language competences contribute to the mobility, employability and personal development of European citizens, in particular young people, in line with the objectives of the Europe 2020 strategy for growth and jobs" (Council of the European Union, 2014, p. 2[16]). Various factors influence the language that is used in the workplace. These include the language contents of goods and services being produced, the language of the markets in which good and services produced are distributed and used, the language of production factors (particularly technology and the workforce), and the language of the owners or of senior management working in a company (Grin, Sfreddo and Vaillancourt, 2011[17]; Martel and Maurais, 1994[18]; Vaillancourt, 1996[19]).

4. The ability for individuals to communicate in more than one language is associated with important individual and societal benefits. For example, multilingualism is associated with positive economic outcomes such as increased employability, and higher wages (Araújo et al., 2015[20]; Gazzola and Mazzacani, 2019[21]; Ginsburgh and Prieto-Rodriguez, 2011[22]; Hahm and Gazzola, 2022[23]; Isphording, 2015[24]; Liwiński, 2019[25]). Such returns could stem from the increased productivity of workers who possess such skills or because language proficiency is used by employers to identify characteristics such as adaptability and openness to other cultures that are valuable but are difficult to evaluate in hiring processes (Armstrong, 2015[26]; Hahm and Gazzola, 2022[23]). Multilingual individuals are also thought to exhibit higher linguistic capacity, superior divergent thinking skills – a facet of creativity, as well as enhanced attentional control, working memory, metalinguistic awareness, and abstract and symbolic representation skills. At the same time, the economic returns to multilingualism appear to be highly heterogeneous across different groups of individuals (Della Chiesa, Scott and Hinton, 2012[1]; Gudykunst, 2003[27]). Individuals who are able to communicate in more than one language are also more likely to display a heightened intercultural understanding and to actively participate in global issues than monolingual individuals (Della Chiesa, Scott and Hinton, 2012[1]; Gudykunst, 2003[27]).

5. Over the last ten years, a number of studies investigated the role of language as a skill in the labour market, exploiting the increased data availability on this topic. Previous work conducted by Antonietti and Loi (2014[28]) combined three sources of survey and administrative data to analyse the demand for language skills in the Italian manufacturing sector in 2004. This study identified a strong demand for language skills in high-skilled occupations (over 50% of the vacancies for managers and professionals required knowledge of at least one language other than Italian), but a much lower demand for low-skilled occupations (less than 5% of “elementary occupations” such as street vendors, hand packers and cleaners demanded language proficiency). Fabo, Beblavý and Lenaerts (2017[29]) examine the demand for language skills using data from online job vacancies in the Czech Republic, Hungary, Poland and the Slovak Republic. They use data from one job portal for each country and find that a substantial proportion of the vacancies required language skills, particularly proficiency in English. Between 28% (in the Czech Republic) and 69% (in Poland) of online vacancies referred to proficiency in English, and vacancies specifying English as a desirable or essential skill to perform the job on average commanded higher salaries than similar jobs without linguistic requirements.

6. This paper builds on such studies but extends them in significant ways. First, the analysis covers a considerably wider set of countries (all European Union countries plus the United Kingdom) and languages (with a focus on the five most demanded languages in the European labour market: English, German, Mandarin Chinese, Spanish and French). Second, the paper employs a novel source of data, the Web Intelligence Hub’s Online Job Advertisement (OJA) database jointly developed by Eurostat and Cedefop (Ascheri et al., 2022[30]; Cedefop, 2019[31]). OJA data are based on online job vacancies posted on between 300 and 400 job portals (the exact number varies over time since some portals are closed, others emerge and others merge over time) yielding a total of over 100 million vacancies, compared to a total of 74 000 vacancies used in Fabo, Beblavý and Lenaerts (2017[29]). Finally, in recognition of the large variation in labour markets conditions across regions within countries, the paper presents statistics at the regional level. The Eurostat’s Nomenclature of Territorial Units for Statistics level 3 (NUTS-3) is used thanks to the fine-grained location classification algorithm used in the classification of online job vacancies. This sheds new light on the economic benefits of language skills by mapping the regional distribution of the demand for language skills in European Union member countries and the United Kingdom.

7. The paper is structured as follows: Section 2 describes the data used. Section 3 illustrates the languages demanded by employers advertising job openings on line in European Union member countries and the United Kingdom. It presents regional data on the percentage of vacancies posted on line requiring English, German, French, Spanish and Mandarin Chinese, as well as data on proficiency in at least one language that is explicitly required in the ad. Section 4 presents data on the association between the extent to which requirements of proficiency in English, German and Mandarin Chinese vary across occupational

groups. In addition, this section analyses what sets of skills are demanded alongside language skills in different occupations and whether language skills requirements are associated with a job's contractual conditions. Section 5 concludes and discusses implications.

2. Data

8. Analyses were conducted using a novel data source jointly produced by Eurostat and Cedefop, the Web Intelligence Hub's Online Job Advertisement (OJA) release "2021q4" database (i.e., the first release containing data for the whole of 2021) (Commission, n.d.[32]). It contains information on 162 million vacancies that were posted on line advertising jobs in European Union countries and the United Kingdom and that were collected between July 2018 and December 2021 (53 million ads refer to 2021, the reference year used in this paper). The dataset was constructed by systematically crawling several hundred data sources, for example job search engines and websites of public employment services. The dataset and the procedures used for data collection are described in Cedefop (2019[31]) and Ascheri et al. (2022[30]). Cedefop (2022[33]) made available some summary dashboards describing the skill data.

9. The OJA dataset contains summary information derived from the text, describing the characteristics of the jobs which were captured through web scraping. These include, for example, if particular educational qualifications are required to be able to apply for the job, the name of the entity that posted the ad, the type of occupation and the industry in which the job will be performed, the salary (or salary range) that applicants can expect to receive in compensation for their work as well as the skills demanded by prospective employers.

10. The analyses presented in this work exploit three main pieces of information extracted from the text of each job vacancy: Skills demanded by employers from prospective applicants interested in filling vacancies they posted on line (at the most granular level in the European Skills, Competencies, Qualifications and Occupations (ESCO) skills classification, at which it is possible to identify language requirements), geographical location (NUTS-3 level) and type of occupation (the International Standard Classification of Occupations (ISCO) 3-digit level). Information on the occupation was available for 100% of the job vacancies. However, geographical location was available at the NUTS-3 level only for 78% of the vacancies: 22% of the vacancies did not have detailed geographical information and were discarded from the analysis. Table 2.1 reveals how occupations with missing information on geographical information are similar in content to those with detailed geographical information in terms of occupation. Furthermore, 11% of the vacancies were not assigned as requiring any specific skill requirement at the most granular skill level. These were included in the analysis as not requiring any skill. This means that estimates presented in this work on the percentage of vacancies requiring certain languages represent a lower-bound estimate of linguistic skills requirements since vacancies without any skill requirement were included. Because results reflect vacancies posted on line, differences across countries, regions within countries and across occupational groups could reflect differences in the extent to which job opportunities available in specific contexts are posted on line. Previous work conducted using online vacancy data in fact indicated that these are more representative of labour market opportunities in contexts with high Internet penetration, for occupations in the tech sector, and more generally for professional and managerial occupations (Cammeraat and Squicciarini, 2021[34]).

Table 2.1. Occupational profile of vacancy data with and without detailed geographical identifiers

Number and percentage of online vacancies with valid and missing information on NUTS-3 region.

					Percentage across all occupations	
Occupation	**N (Non missing)**	**N (Missing)**	**N (Total)**	**% Missing**	**Among non missing**	**Among missing**
Managers	12 754	297	13 051	2.28%	8.72%	9.11%
Professional	31 418	697	32 115	2.17%	21.49%	21.39%
Technicians and associate professionals	23 817	521	24 338	2.14%	16.29%	15.99%
Clerical support workers	10 390	223	10 613	2.10%	7.11%	6.84%
Service and sales workers	16 437	357	16 794	2.13%	11.24%	10.95%
Skilled agricultural, forestry and fishery workers	3 872	108	3 980	2.71%	2.65%	3.31%
Craft and related trades workers	18 100	387	18 487	2.09%	12.38%	11.87%
Plant and machine operators, and assemblers	16 764	384	17 148	2.24%	11.47%	11.78%
Elementary occupations	12 651	285	12 936	2.20%	8.65%	8.75%
Total	146 203	3 259	149 462	2.18%	100.00%	100.00%

Note: Occupations are identified using the ISCO 08 classification.
Source: Web Intelligence Hub's Online Job Advertisement (OJA) release "2021q4" database.

11. Most categorical variables were classified based on what is referred to as an "ontology matching" model (Ascheri et al., 2022[30]). In this model, each category of each variable (for example, the category "accountant" in the occupation variable) was associated to one or more tags (e.g. "accountant", "accounting analyst" and "internal auditor"). When a tag referring to an occupation was found in the vacancy text, the vacancy was classified in that category (whenever more tags were found, the model retained the tag with the largest number of characters and selected the respective category). In the case of occupation, vacancies that were not classified through the ontology model were classified through a machine learning model. Overall, the estimated accuracy of this classifier was 80% (Ascheri et al., 2022[30]). For geographical location and skills, other variables used in this model, only the ontology matching was used.

3. The demand for language skills in online job vacancies

3.1. The distribution of the demand for language skills in online job vacancies

12. Table 3.1 illustrates the number of job vacancies explicitly requiring knowledge of each of the languages present in the OJA dataset. Table 3.1 reflects vacancies written in any language and posted in any country, as long as the text of the job vacancy explicitly indicated that applicants for the vacancy should possess at least some knowledge of such language to be able to perform the job.

13. English was by far the most requested language in 2021: over 11 million vacancies were posted explicitly specifying knowledge of English, corresponding to around 22% of all vacancies that were posted on line in European Union countries or in the United Kingdom in 2021. The importance of English as a key skill can also be gauged by comparing the number of job vacancies mentioning English as a required skill with the number of vacancies mentioning other skills requirements. English was the sixth most-required skill in online job vacancies out of all the skills classified in the most detailed level of the ESCO classification, making English one of the most widely requested transversal skills. The five skills that were mentioned more frequently than English in 2021 in online job vacancies were: the capacity to “adapt to change”, “work in teams”, “use a computer”, “teamwork principles” and “use Microsoft office”. English was mentioned in more vacancies than other widely demanded skills, including the capacity to “assist customers”, “create solutions to problem” and “communication”. This reflect results from other studies using online job ads and focused on smaller groups of countries (Kiškytė, 2023[35]; Fabo, Beblavý and Lenaerts, 2017[29]).

14. German was the second most requested language: around 900 000 job vacancies were posted in 2021 explicitly requiring knowledge of German. Spanish, Mandarin Chinese and French were the third, fourth and fifth most requested languages: around 800 000 job vacancies were posted in 2021 requiring knowledge of Spanish, 700 000 job vacancies required knowledge of Mandarin Chinese and 600 000 job vacancies required knowledge of French.

15. Local languages or national languages spoken by relatively small communities, such as Basque, Finnish and Welsh, are also in relatively high demand. This could be due to the need to establish economic ties with the local communities (for example communicating effectively with local customers), or in some cases to other employers’ preferences (Chen, 2022[36]). Some other languages, such as Arabic, Turkish or Bihari, probably reflect international migration and trade.

Table 3.1. Online job vacancies explicitly requiring knowledge of a language in 2021, by language

Language	Number (% of total online vacancies)	Language	Ads
English	11 383 304 (21.6%)	Russian	11 310 (<0.1%)
German	892 281 (1.7%)	Czech	8 382 (<0.1%)
Spanish	812 593 (1.5%)	Danish	5 265 (<0.1%)
Mandarin Chinese	659 671 (1.3%)	Hungarian	3 879 (<0.1%)
French	604 827 (1.1%)	Greek	2 785 (<0.1%)
Basque	417 394 (0.8%)	Icelandic	2 221 (<0.1%)
Dutch	374 298 (0.7%)	Slovak	1 293 (<0.1%)
Arabic	244 481 (0.5%)	Croatian	1 113 (<0.1%)
Finnish	235 692 (0.4%)	Turkish	1 024 (<0.1%)
Italian	193 635 (0.4%)	Romanian	968 (<0.1%)
Polish	78 858 (0.1%)	Slovenian	921 (<0.1%)
Welsh	75 368 (0.1%)	Bulgarian	843 (<0.1%)
Norwegian	70 239 (0.1%)	Bihari	520 (<0.1%)
Swedish	35 318 (<0.1%)	Portuguese	416 (<0.1%)
Latvian	11 603 (<0.1%)	Maltese	357 (<0.1%)

Note: Languages are sorted in descending order of the number of online job vacancies explicitly requiring a language, which indicates the number of vacancies explicitly requiring such language in the vacancy text independently of the language in which they were written and the country in which they were posted. Un-weighted count across European Union countries and the United Kingdom. The percentage of total online vacancies reflects the number of online job vacancies explicitly requiring a language over the total number of job vacancies posted in 2021 in European Union countries and the United Kingdom.
Source: Web Intelligence Hub's Online Job Advertisement (OJA) release "2021q4" database.

16. Ads written in a language implicitly require some knowledge of that language. For example, if an ad in the Netherlands is written in English (or German, Spanish or French), then this ad requires some knowledge of English (or German, Spanish or French), even if this requirement is not made explicit in that ad. Table 3.2 shows the prevalence of these implicit requirements, i.e. the percentage of vacancies that were posted on line that were written in English, German, Spanish and French. Results suggest that in many countries a large number of vacancies were written in English, even countries in which English is not one of the official languages. For example, 58% of job postings advertised on line in Luxembourg were written in English. By contrast, vacancies were rarely written in German, Spanish and French outside of countries in which these languages are official languages. At the same time results indicate that unless individuals are proficient in the official languages used in a country, their labour market opportunities remain limited. 92% of vacancies that were posted on line in Austria in 2021 were written in German and so were 95% of vacancies posted on line in Germany. Similarly, 98% of vacancies posted on line in 2021 in France were written in French. In Spain, Belgium, Luxembourg figures for any one language are lower because these countries have several official languages.

Table 3.2. Implicit language requirements in 2021, by country

Percentage of vacancies written in German, English Spanish or French

Country	Average			
	German	English	Spanish	French
Austria	91.64	7.27	0.01	0.08
Belgium	1.59	20.18	0.01	13.73
Bulgaria	2.11	15.99	0.11	0.07
Croatia	0.16	31.10	0.04	0.13
Cyprus*	0.88	55.62	0.06	0.16
Czech Republic	0.15	7.27	0.03	0.01
Denmark	0.07	11.71	0.00	0.02
Estonia	0.76	18.29	0.15	2.10
EU average	0.60	9.87	0.02	0.01
Finland	0.21	18.60	0.02	0.04
France	0.11	1.82	0.03	97.79
Germany	94.97	4.74	0.01	0.04
Greece*	2.15	45.82	0.26	0.61
Hungary	1.03	19.21	0.08	0.13
Ireland	0.11	99.54	0.02	0.07
Italy	0.20	4.64	0.06	0.51
Latvia	0.66	5.60	0.00	0.00
Lithuania	0.24	13.00	0.23	0.00
Luxembourg	4.42	57.84	0.01	37.41
Malta	0.32	98.99	0.06	0.03
Netherlands	0.67	12.24	0.02	0.08
OECD average	0.72	15.34	0.11	2.46
Poland	0.02	14.79	0.01	0.00
Portugal	1.08	30.52	1.57	0.51
Romania	0.76	32.37	1.12	0.30
Slovak Republic	0.46	8.49	0.01	0.36
Slovenia	0.73	3.63	0.00	0.01
Spain	0.29	12.42	83.74	0.33
Sweden	0.03	12.40	0.01	0.01
United Kingdom	0.36	98.99	0.01	0.15

Notes: In the phase of development of the database, some difficulties were encountered in guaranteeing data coverage for Bulgaria, Croatia, Cyprus, Greece, and Luxembourg (Cedefop, 2019[31]).
Vacancies written in Mandarin Chinese are rare and have been excluded by the Web Intelligence Hub's Online Job Advertisement database. Countries are sorted alphabetically. The EU average includes countries that are member of the European Union (EU) in the sample. The OECD average includes countries that are member of the OECD in the sample. EU and OECD averages exclude for each column, countries with values higher than 80% in the respective language requirement (i.e. Ireland, Malta and the United Kingdom are excluded for English; Austria and Germany are excluded for German; Spain is excluded for Spanish; and France is excluded for French).
Source: Web Intelligence Hub's Online Job Advertisement (OJA) release "2021q4" database.

17. Table 3.3 shows, for each country, the percentage of vacancies that were posted in 2021 and that required at least some knowledge of one of the five languages that appear to be most in demand in the combined sample of online vacancies posted in European Union countries and the United Kingdom: English, German, Spanish, Mandarin Chinese, French. This percentage combines vacancies that explicitly required at least some knowledge of English, German, Spanish, Mandarin Chinese or French in the vacancy text and vacancies that were written in one of these languages (with language skills implicitly assumed). For example, a vacancy posted in Austria would be classified as requiring at least some knowledge of English if the vacancy was written in German but specified that applicants would need to be able to communicate in English to be considered. In addition, it would be classified as requiring some knowledge of English if it did not explicitly specify any language knowledge, but it was written directly in English. It is reasonable to expect that ads that are written in English refer to jobs where this language is to some extent used, even though they may not mention English as a specific requirement. Finally, the last column of Table 3.3 shows the percentage of vacancies that explicitly mentioned some knowledge of at least one language in the vacancy text (including languages other than English, German, Spanish, Mandarin Chinese or French) without considering the language in which the vacancy text was written.

18. When excluding countries in which English is an official language (United Kingdom, Ireland and Malta), knowledge of English was requested in 40% or more of online vacancies posted in 2021 in Belgium, Cyprus, France, Germany, Greece, Hungary, Luxembourg, Portugal and Romania. By contrast, knowledge of English was requested in 15% or less of online vacancies posted in 2021 in Estonia, Latvia, and Slovenia. For German language requirements, except for Austria and Germany, knowledge of German was requested in 18% of vacancies posted on line only in Luxembourg, followed by 7% in Belgium. Spanish was especially requested in Croatia and Portugal, where 15% and 29% of online vacancies respectively requested Spanish. Mandarin Chinese was requested in over 2% of online vacancies posted in 2021 in the United Kingdom and French was requested in 20% of vacancies posted in Belgium, and 54% of vacancies posted in Luxembourg. On average across countries in the sample around one in five vacancies requested at least some knowledge of a language.

Table 3.3. Explicit and implicit language requirements in online job vacancies in 2021, by country

Country	English	German	Spanish	Mandarin Chinese	French	At least one language explicitly required
Austria	37.05	93.85	1.50	0.46	0.12	32.73
Belgium	47.07	7.40	1.05	0.15	20.26	34.29
Bulgaria	18.54	5.67	2.46	0.00	0.29	6.50
Croatia	33.95	15.18	15.01	0.00	15.10	31.68
Cyprus*	55.62	0.88	0.06	0.00	0.16	0.00
Czech Republic	26.97	4.22	0.83	0.00	0.64	23.32
Denmark	39.82	0.30	0.00	0.00	0.02	36.36
EU	34.18	3.31	2.74	0.21	4.00	20.49
Estonia	13.62	0.60	0.02	0.00	0.01	4.92
Finland	19.66	0.21	0.02	0.00	0.04	1.28
France	47.23	1.24	1.21	1.59	98.38	48.03
Germany	40.39	97.08	2.09	1.38	0.65	38.73
Greece*	50.50	2.15	0.51	0.00	0.61	6.72
Hungary	42.24	6.53	1.47	0.00	0.29	29.73
Ireland	99.54	1.39	1.79	0.88	1.30	5.11
Italy	28.78	1.22	0.58	0.51	2.13	27.28
Latvia	11.41	0.97	0.00	0.00	0.00	7.92
Lithuania	30.21	1.00	0.23	0.00	0.00	17.95
Luxembourg	66.49	17.69	7.81	0.00	53.90	29.61
Malta	98.99	0.32	0.06	0.00	0.03	0.00

Country	English	German	Spanish	Mandarin Chinese	French	At least one language explicitly required
Netherlands	34.36	1.70	0.75	0.27	0.92	26.96
OECD	32.83	2.85	2.37	0.35	4.04	21.61
Poland	24.35	4.31	2.02	0.20	0.84	20.41
Portugal	41.65	4.22	28.90	0.14	4.09	36.29
Romania	56.97	2.08	2.20	0.11	0.98	27.14
Slovak Republic	15.75	1.08	0.33	0.00	0.36	8.74
Slovenia	12.98	0.73	0.00	0.00	0.01	9.35
Spain	20.58	1.03	86.98	0.00	1.04	12.62
Sweden	38.35	0.52	0.22	0.05	0.15	29.44
United Kingdom	99.26	1.43	0.76	2.46	1.52	9.21

Notes: In the phase of development of the database, some difficulties were encountered in guaranteeing data coverage for Bulgaria, Croatia, Cyprus, Greece, and Luxembourg (Cedefop, 2019[31]).
Countries are sorted alphabetically. The EU average includes countries that are member of the European Union in the sample. The OECD average includes countries that are member of the OECD in the sample. EU and OECD averages exclude for each column, countries with values higher than 80% in the respective language requirement (i.e. Ireland, Malta and the United Kingdom are excluded for English; Austria and Germany are excluded for German; Spain is excluded for Spanish; and France is excluded for French). "English", "German", Spanish" and "French" include both ads explicitly requiring this language and implicitly requiring it (because they are written in that language); "At least one language explicitly required" includes only ads that explicitly require one of the languages listed in Table 3.1. "Mandarin Chinese" includes only vacancies that explicitly require this language.
Source: Web Intelligence Hub's Online Job Advertisement (OJA) release "2021q4" database.

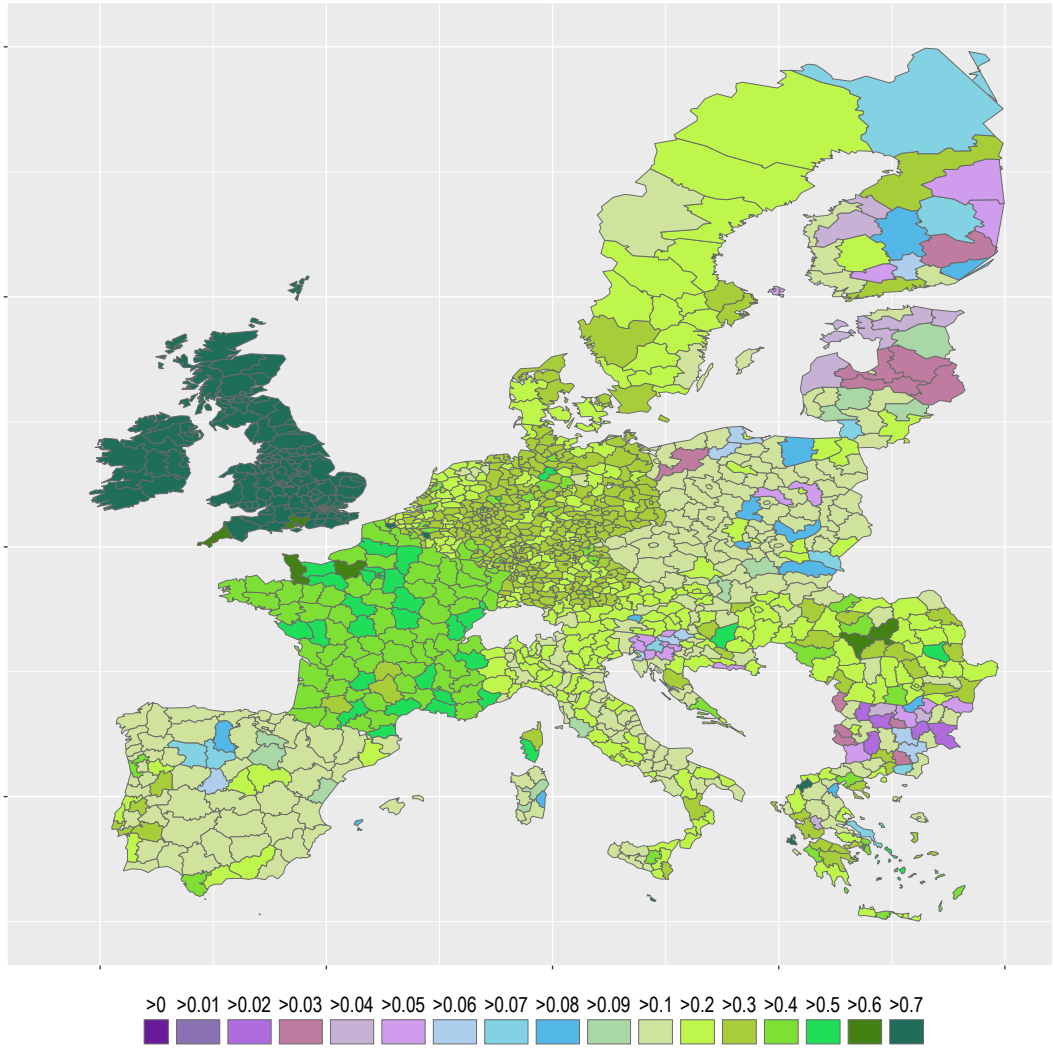
3.2. The regional distribution of the demand for language skills in online job vacancies

19. Figure 3.1 shows the proportion of online job vacancies requiring English explicitly or implicitly, by NUTS3 region. For each NUTS3 region, the figure shows the average proportion of job vacancies requiring English across ISCO occupational categories (3-digit). The regional distribution shows a demand for English skills that is strong across Europe, but it is especially strong in wealthier and more densely populated regions. This reflects results from spatial regression analysis on the same dataset (Marconi and Vergolini, 2022[37]). The simple proportion for each region, not averaged across ISCO categories, can be found in Figure A A.1. , in Annex A. The difference between the two figures is that Figure A A.1. reports the simple average on the pooled sample; in Figure 3.1 first, for each ISCO occupation the proportion of online vacancies requiring English was calculated, and then the simple average across all occupations was computed. Results presented in Figure 3.1 account for the fact that online vacancies data suffer from selection, i.e. certain occupations are overrepresented in the data (Cammeraat and Squicciarini, 2021[34]). Using the arithmetic mean across occupations as suggested in the literature (Ascheri et al., 2022[30]) avoids excessive weight to overrepresented occupations. The tables underlying all the charts in this paper are available in the GitHub repository created by (Marconi and Vergolini, 2022[37]).

20. In around one in two regions (excluding regions in countries in which English is an official language, namely Ireland, Malta, and the United Kingdom), at least 30% of online job ads implicitly (i.e. being written in English) or explicitly (i.e. English being required in vacancy text) required some knowledge of English in 2021. The percentage of online job vacancies posted in 2021 outside of countries in which English was an official language requiring at least some knowledge of English varied between 1.5% in La Gomera (Spain) and 95% in Ithaki-Kefallinia (Greece).

Figure 3.1. The regional distribution of online job vacancies implicitly or explicitly requiring at least some knowledge of English in 2021, by NUTS-3 region

Percentage of all online vacancies posted on line



Note: The tables underlying all the charts in this paper are available in the GitHub repository created by Marconi and Vergolini (2022[37]). Not in the map: Região Autónoma dos Açores 0.19, Região Autónoma da Madeira 0.15, El Hierro 0.12, Fuerteventura 0.17, Gran Canaria 0.14, La Gomera 0.02, La Palma 0.11, Lanzarote 0.09, Tenerife 0.17, Guadeloupe 0.38, Martinique 0.37, Guyane 0.37, La Réunion 0.4, Mayotte 0.36
In the phase of development of the database, some difficulties were encountered in guaranteeing data coverage for Bulgaria, Croatia, Cyprus, Greece, and Luxembourg (Cedefop, 2019[31]). Less than 100 vacancies were identified in six NUTS-3 regions and results for these six regions are not illustrated.
Source: Web Intelligence Hub's Online Job Advertisement (OJA) release "2021q4" database.

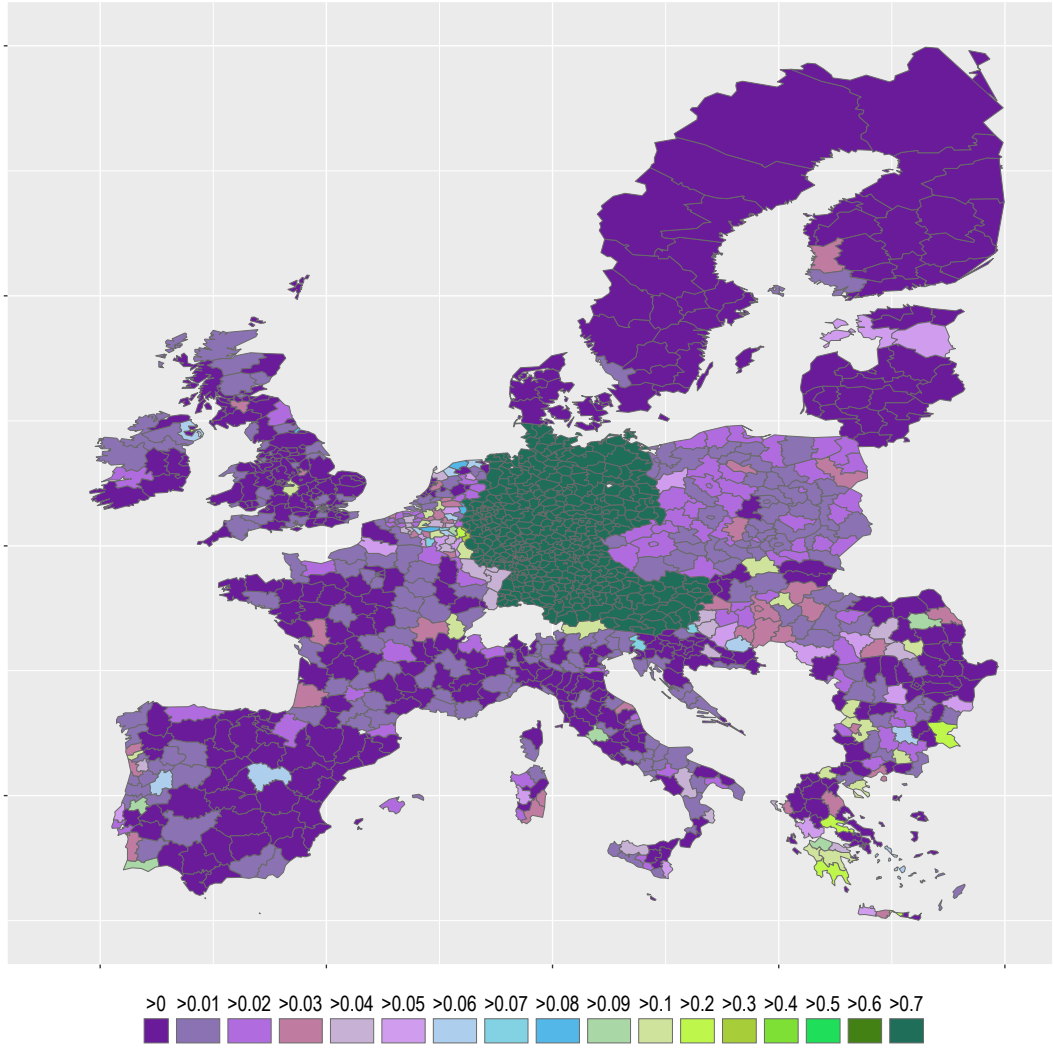
21. Figure 3.2 indicates that outside Germany and Austria, regions with a high proportion of ads requiring German typically reside close to the border with these two countries and in countries where German is among the official languages like Belgium and Luxembourg. In addition, German appears to be highly demanded in regions where the hospitality and tourism sector is an important driver of economic activity. For instance, around one quarter of all vacancies posted in Irakleio (Greece) and Burgas (Bulgaria) in 2021 explicitly or implicitly requested at least some knowledge of German. There is only one region (Verviers, in Belgium) in which the share of vacancies posted on line requiring at least some knowledge of

German exceeds 30%. Data presented in Figure 3.3 suggest that only in around one-third (36%) of regions in the European Union and the United Kingdom at least 1.5% of vacancies posted on line explicitly or implicitly required at least some knowledge of German. For comparison, in 2021 in all regions in the European Union and the United Kingdom at least 1.5% of online vacancies required at least some knowledge of English.

22. Figure 3.2 exemplifies a pattern common to results on the demand for languages skills in Europe with the exception of English: the demand for language skills is low except for few selected regions outside of regions in which a particular language is not the official language or one of the official languages used. Regions in which tourism and hospitality are drivers of economic growth or regions that are geographically close to the country in which a language is the or one of the official languages used for communication and hence large-scale local trade occurs, are the only regions in which language skills appear to be especially valued. For example, Figure 3.3 and Figure 3.4 suggest that Spanish and French are widely demanded in the countries in which these languages are official languages (Spain for Spanish, France, Belgium and Luxembourg for French), in regions close to these countries or regions with important tourism and hospitality sectors (such as the coastal area of Croatia for both Spanish and French). Spanish is also widely requested in almost all regions in Portugal, in a specific province in Romania (Bistrita-Nasaud) and in Zante. French is highly demanded in Bernkastel-Wittlich (a German province close to Luxembourg), Gottingen and in Lasithi (one of the provinces of Crete, Greece).

Figure 3.2. The regional distribution of online job vacancies implicitly or explicitly requiring at least some knowledge of German in 2021, by NUTS-3 region

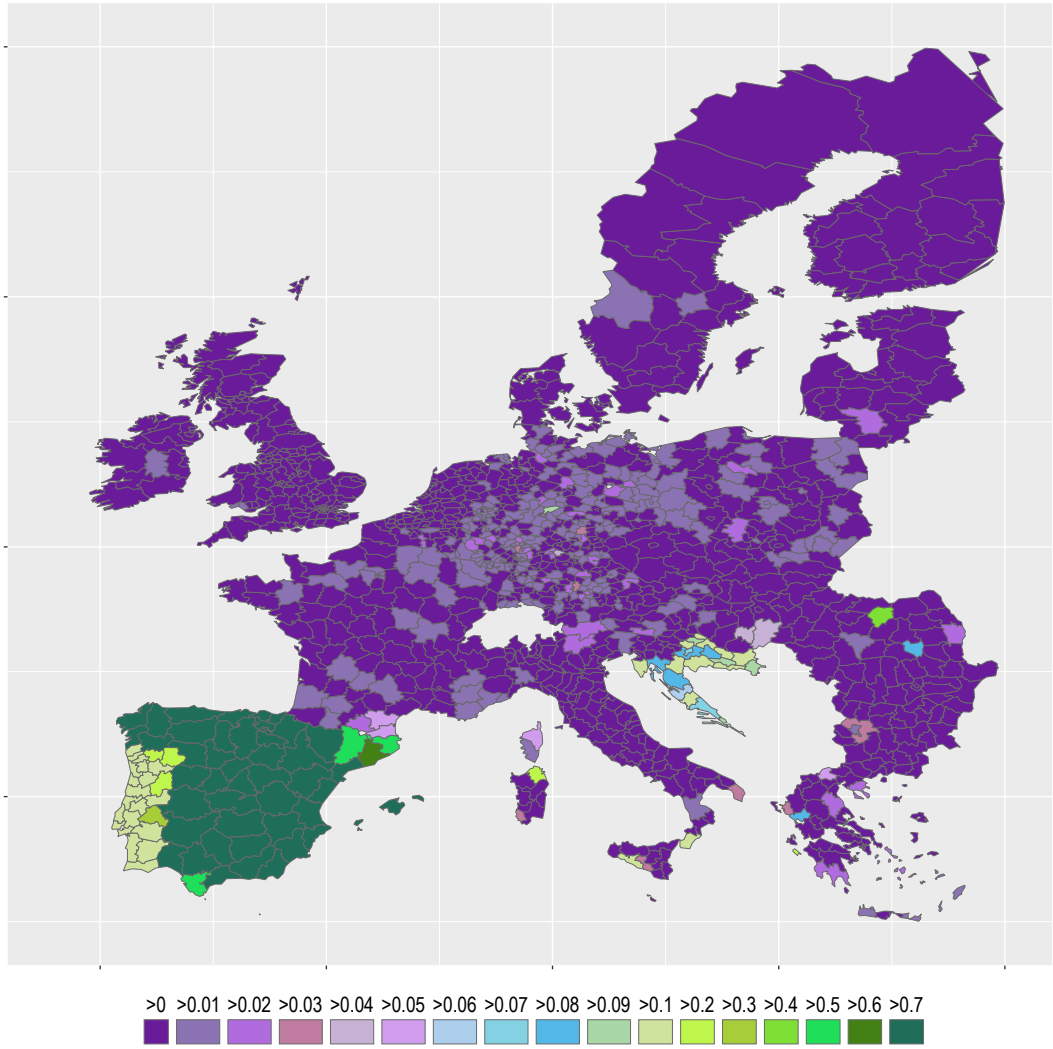
Proportion by NUTS-3 regions, 2021



Note: The tables underlying all the charts in this paper are available in the GitHub repository created by Marconi and Vergolini (2022[37]). Not in the map: Região Autónoma dos Açores 0.01, Região Autónoma da Madeira 0.1, El Hierro 0.01, Fuerteventura 0.01, Gran Canaria 0.01, La Gomera 0.04, La Palma 0.01, Lanzarote 0.01, Tenerife 0.01, Guadeloupe 0.01, Martinique 0.01, Guyane 0.02, La Réunion 0.01, Mayotte 0. In the phase of development of the database, some difficulties were encountered in guaranteeing data coverage for Bulgaria, Croatia, Cyprus, Greece, and Luxembourg (Cedefop, 2019[31]). Less than 100 vacancies were identified in six NUTS-3 regions and results for these six regions are not illustrated.
Source: Web Intelligence Hub's Online Job Advertisement (OJA) release "2021q4" database.

Figure 3.3. The regional distribution of online job vacancies requiring at least some knowledge of Spanish in 2021, by NUTS-3 region

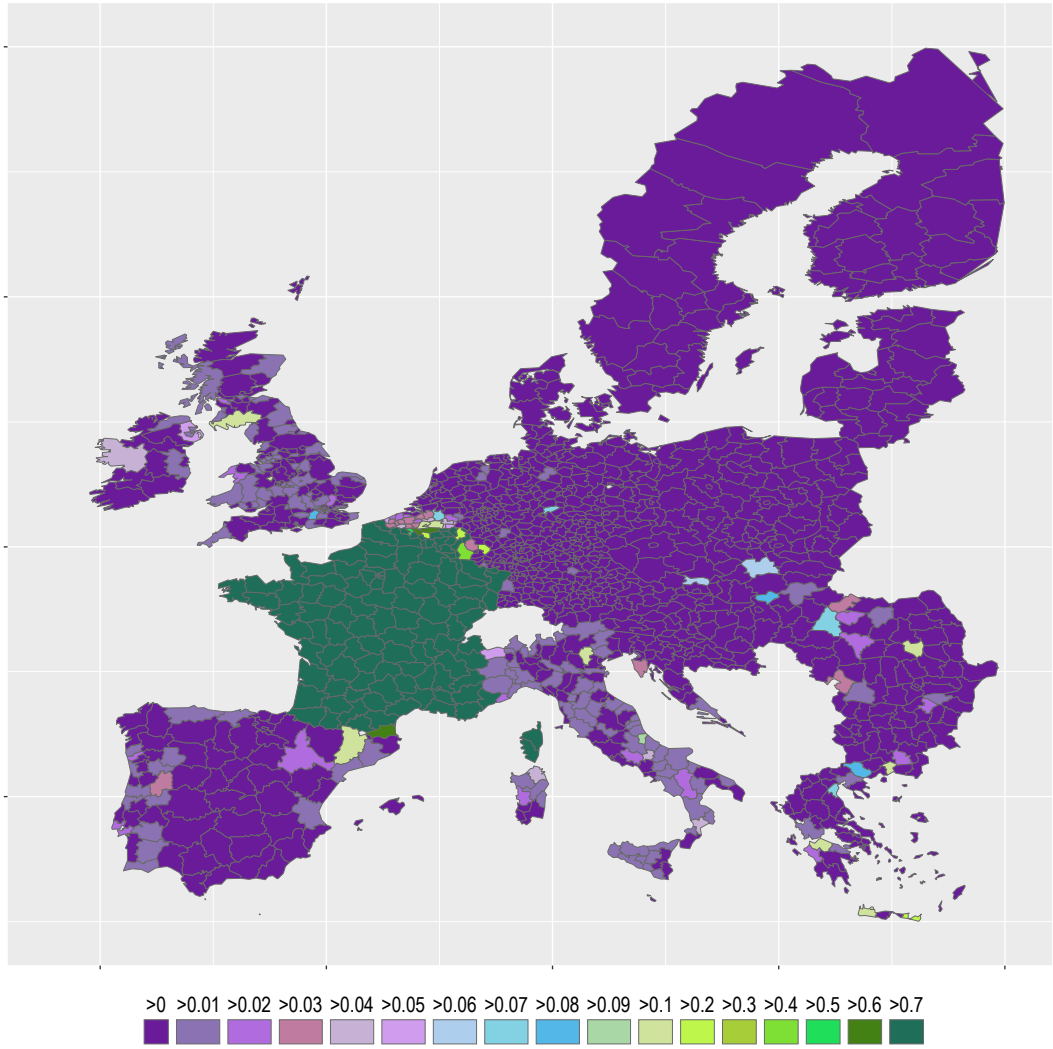
Proportion by NUTS-3 regions, 2021



Note: The tables underlying all the charts in this paper are available in the GitHub repository created by Marconi and Vergolini (2022[37]). Not in the map: Região Autónoma dos Açores 0.16, Região Autónoma da Madeira 0.2, El Hierro 0.96, Fuerteventura 0.94, Gran Canaria 0.9, La Gomera 0.97, La Palma 0.94, Lanzarote 0.95, Tenerife 0.87, Guadeloupe 0, Martinique 0, Guyane 0.01, La Réunion 0, Mayotte 0. In the phase of development of the database, some difficulties were encountered in guaranteeing data coverage for Bulgaria, Croatia, Cyprus, Greece, and Luxembourg (Cedefop, 2019[31]). Less than 100 vacancies were identified in six NUTS-3 regions and results for these six regions are not illustrated.
Source: Web Intelligence Hub's Online Job Advertisement (OJA) release "2021q4" database.

Figure 3.4. The regional distribution of online job vacancies requiring at least some knowledge of French in 2021, by NUTS-3 region

Proportion by NUTS-3 regions, 2021



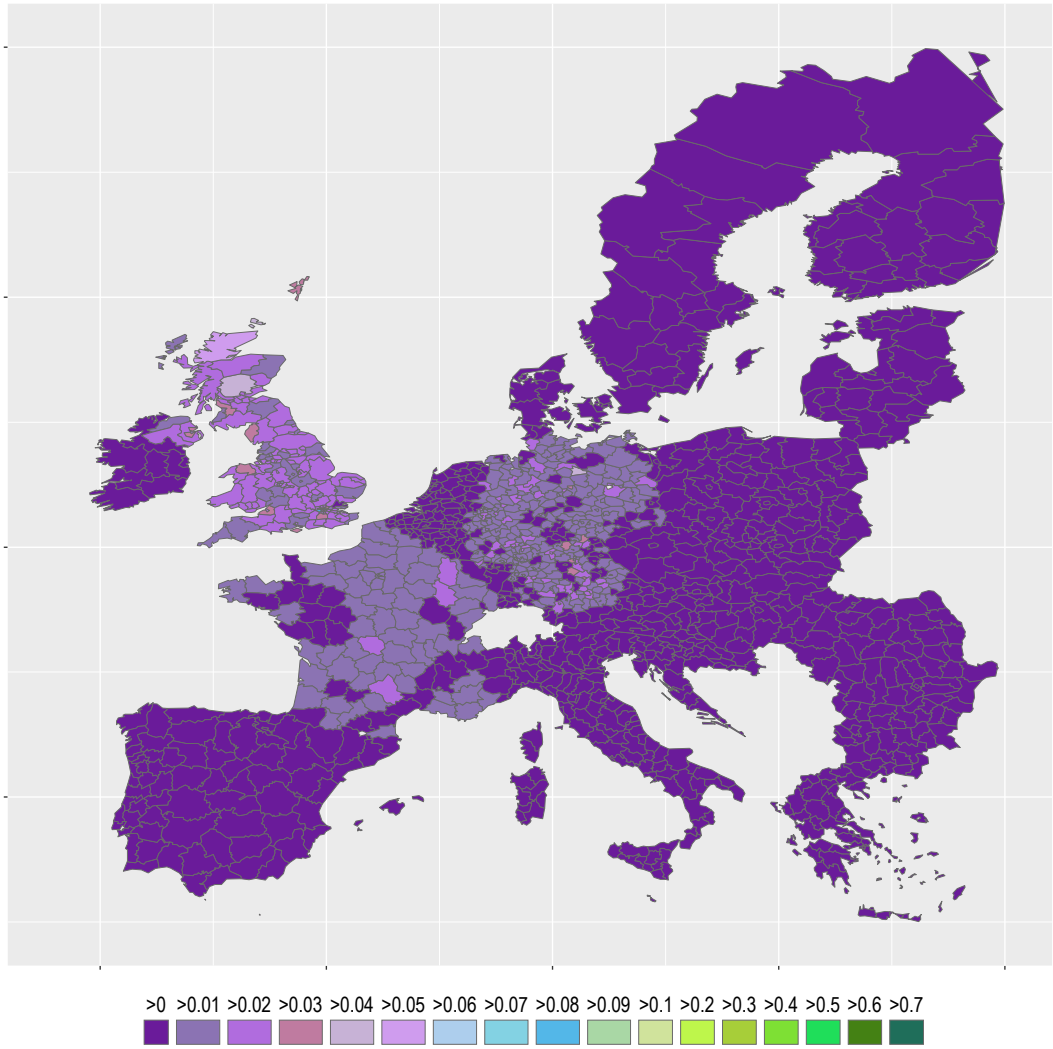
Note: The tables underlying all the charts in this paper are available in the GitHub repository created by Marconi and Vergolini (2022[37]). Not in the map: Região Autónoma dos Açores 0.01, Região Autónoma da Madeira 0, El Hierro 0, Fuerteventura 0, Gran Canaria 0, La Gomera 0.01, La Palma 0, Lanzarote 0, Tenerife 0, Guadeloupe 0.99, Martinique 0.97, Guyane 0.96, La Réunion 0.93, Mayotte 0.94. In the phase of development of the database, some difficulties were encountered in guaranteeing data coverage for Bulgaria, Croatia, Cyprus, Greece, and Luxembourg (Cedefop, 2019[31]). Less than 100 vacancies were identified in six NUTS-3 regions and results for these six regions are not illustrated.
Source: Web Intelligence Hub's Online Job Advertisement (OJA) release "2021q4" database.

23. The demand for Mandarin Chinese (Figure 3.5) follows a different pattern from the one observed for large European languages such as French, Spanish and German, for the simple reason that Mandarin Chinese is not an official language in any European country. The percentage of online job vacancies that were posted in 2021 requiring at least some knowledge of Mandarin Chinese is equal or larger than 1.5% in about one quarter (26%) of European regions. This proportion ranges from 0% in various European regions to 10% in Hounslow and Richmond upon Thames (United Kingdom). Among European countries, it was highest in France, Germany and the United Kingdom, countries in which the overall demand for

workers with at least some knowledge of Mandarin Chinese exceeds 1%, on average across all regions in the country.

Figure 3.5. The regional distribution of online job vacancies requiring at least some knowledge of Mandarin Chinese in 2021, by NUTS-3 region

Proportion by NUTS-3 regions, 2021



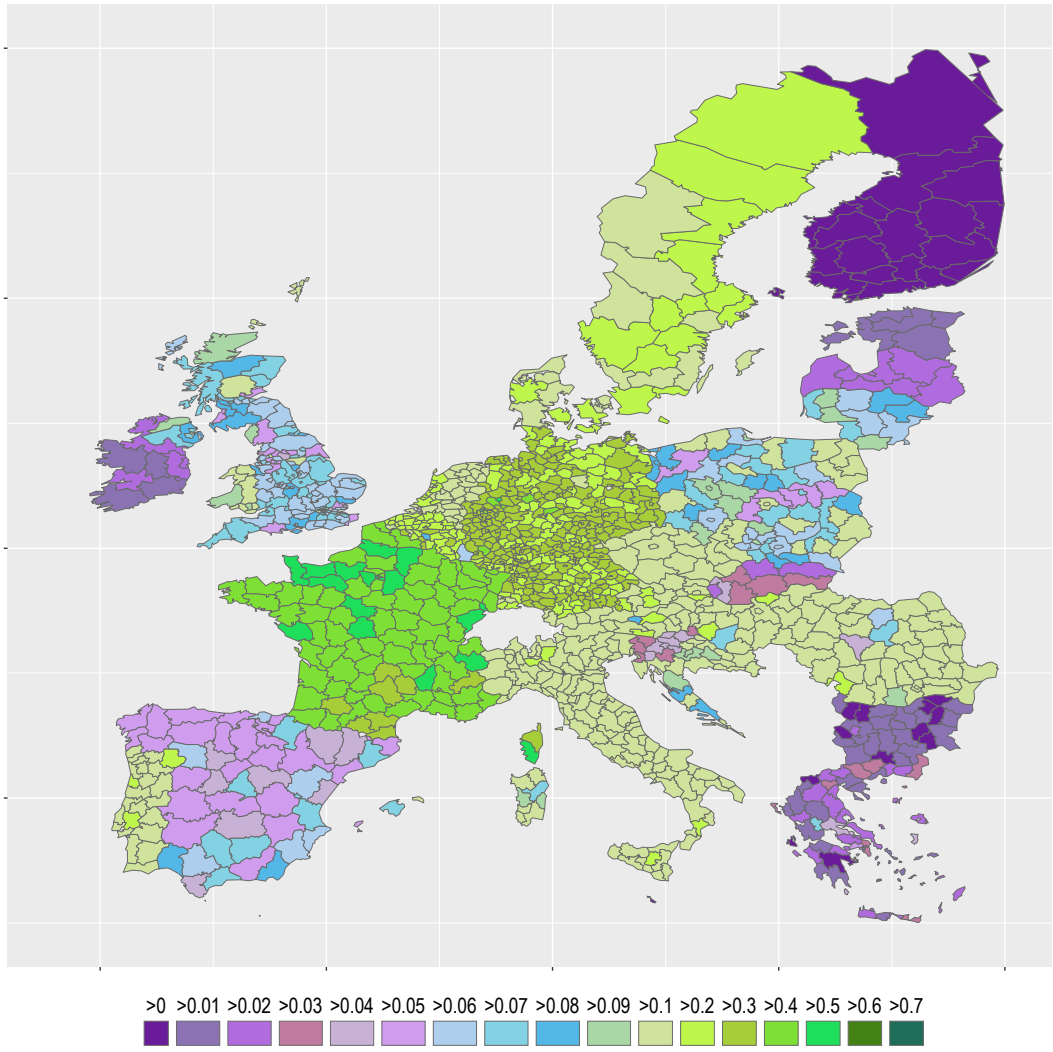
Note: The tables underlying all the charts in this paper are available in the GitHub repository created by Marconi and Vergolini (2022[37]). Not in the map: Região Autónoma dos Açores 0, Região Autónoma da Madeira 0, El Hierro 0, Fuerteventura 0, Gran Canaria 0, La Gomera 0, La Palma 0, Lanzarote 0, Tenerife 0, Guadeloupe 0.01, Martinique 0.01, Guyane 0.02, La Réunion 0.01, Mayotte 0.01. In the phase of development of the database, some difficulties were encountered in guaranteeing data coverage for Bulgaria, Croatia, Cyprus, Greece, and Luxembourg (Cedefop, 2019[31]). Less than 100 vacancies were identified in six NUTS-3 regions and results for these six regions are not illustrated.
Source: Web Intelligence Hub's Online Job Advertisement (OJA) release "2021q4" database.

24. Figure 3.6 shows the proportion of online job vacancies explicitly requiring at least one language in European Union regions and regions in the United Kingdom. The proportion of online job ads explicitly requiring at least one language exceeds 30% in almost one third (30%) of European regions, and it exceeds 1.5% in almost all regions (96%). This proportion ranges from close to 0% in various European regions to 67% in the Isle of Anglesey (United Kingdom). These figures are slightly lower than estimates

for the demand for English alone based on Figure 3.1. This is possible because Figure 3.1 includes online vacancies written in English in addition to vacancies explicitly requiring it, while Figure 3.6 only includes ads explicitly requiring at least one language. An important limitation of analyses of the demand for language skills based on online job vacancies is that in certain contexts language skills are so pervasive in a population that they can be assumed. This is the case in multilingual societies such as Malta.

Figure 3.6. The regional distribution of online job vacancies explicitly requiring at least one language skill in 2021, by NUTS-3 region

Proportion by NUTS-3 regions, 2021



Note: The tables underlying all the charts in this paper are available in the GitHub repository created by Marconi and Vergolini (2022[37]). Not in the map: Região Autónoma dos Açores 0.2, Região Autónoma da Madeira 0.24, El Hierro 0.08, Fuerteventura 0.13, Gran Canaria 0.06, La Gomera 0.06, La Palma 0.08, Lanzarote 0.05, Tenerife 0.08, Guadeloupe 0.39, Martinique 0.35, Guyane 0.36, La Réunion 0.38, Mayotte 0.34. In the phase of development of the database, some difficulties were encountered in guaranteeing data coverage for Bulgaria, Croatia, Cyprus, Greece, and Luxembourg (Cedefop, 2019[31]). Less than 100 vacancies were identified in six NUTS-3 regions and results for these six regions are not illustrated.
Source: Web Intelligence Hub's Online Job Advertisement (OJA) release "2021q4" database.

4. The demand for languages skills across occupations and their association with other skills

4.1. The variation in the demand for language skills across occupations

25. This section considers how the demand for language skills differs across the following occupations: managers; professionals; technicians and associate professionals; clerical support workers; service and sales workers; skilled agricultural, forestry and fishery workers; craft and related trades workers; plant and machine operators, and assemblers; elementary occupations. These occupations correspond to broad occupational groups classified by the International Labour Organisation (ILO) using the ISCO 1 digit level classification (ILO, 2012[38]). Workers employed in the same broad occupational category tend to perform tasks and duties and to have a set of skills that are more similar than those of workers employed in other occupational categories. It has to be stressed that whereas for non-manual occupations there is a very high probability that vacancies will be posted on line, the same might not true for manual occupations. To the extent that vacancies posted on line are more likely to also require language skills than those not posted on line, it is possible that the demand for language skills for certain occupations estimated using online vacancies might be higher than the demand in all vacancies for occupations with a lower likelihood of vacancies being posted on line.

26. Analyses of differences in the demand for language skills across occupations were conducted for English, Mandarin Chinese, German, French and Spanish. Estimates reported in Section 3 indicate that in 2021 English was the language in highest demand and the literature indicates that English is the most widely used language, with the vast majority of users being non-native users: out of roughly 1.5 billion users of English worldwide, English was the native language only for 375 million people (Eberhard et al., 2023[39]). English is also the means of communication of the most innovative sectors of the economy, including the scientific community (Montgomery, 2013[40]) and the tech sector (Spence and Liu, 2013[41]). German, French and Spanish were the other languages with a relatively large demand in 2021 in Europe. Finally, Mandarin Chinese is a language with a distinct demand pattern across Europe, possibly linked to international trade and migration patterns. The People's Republic of China (hereafter 'China') is a major exporter worldwide and Mandarin Chinese is globally the language that is spoken as a first language by the largest number of individuals: estimates suggest that out of the 1.12 billion users of Mandarin Chinese, only around 200 000 are non-native users of the language (Eberhard et al., 2023[39]).

27. Figure 4.1. shows the percentage of online vacancies implicitly or explicitly requiring English language skills in managerial, professionals and technicians and associate professional occupations. Workers in these occupations often completed tertiary or upper secondary degrees and have high levels of foundation skills, technical skills and transversal skills to be able to complete challenging cognitive tasks (ILO, 2012[38]). On average across EU member countries, one in two vacancies advertising managerial and professional occupations either explicitly or implicitly require applicants to have at least some knowledge of English. In Luxembourg around 8 in 10 vacancies advertised on line for managerial or

professional jobs explicitly or implicitly demanded at least some knowledge of English. English was also highly demanded in Belgium, France, Greece, Portugal and Romania: in all these countries over 6 in 10 vacancies posted on line for managers explicitly or implicitly demanded at least some knowledge of English. By contrast in Slovenia less than 2 in 10 vacancies posted on line for managers explicitly or implicitly demanded at least some knowledge of English. Panel C of Figure 4.1. suggests that on average across EU countries around 33% and 36% respectively of vacancies posted on line for technicians or associate professionals explicitly or implicitly demanded at least some knowledge of English with Croatia being the country with the highest demand (67%) and Slovenia the country with the weakest demand (11%).

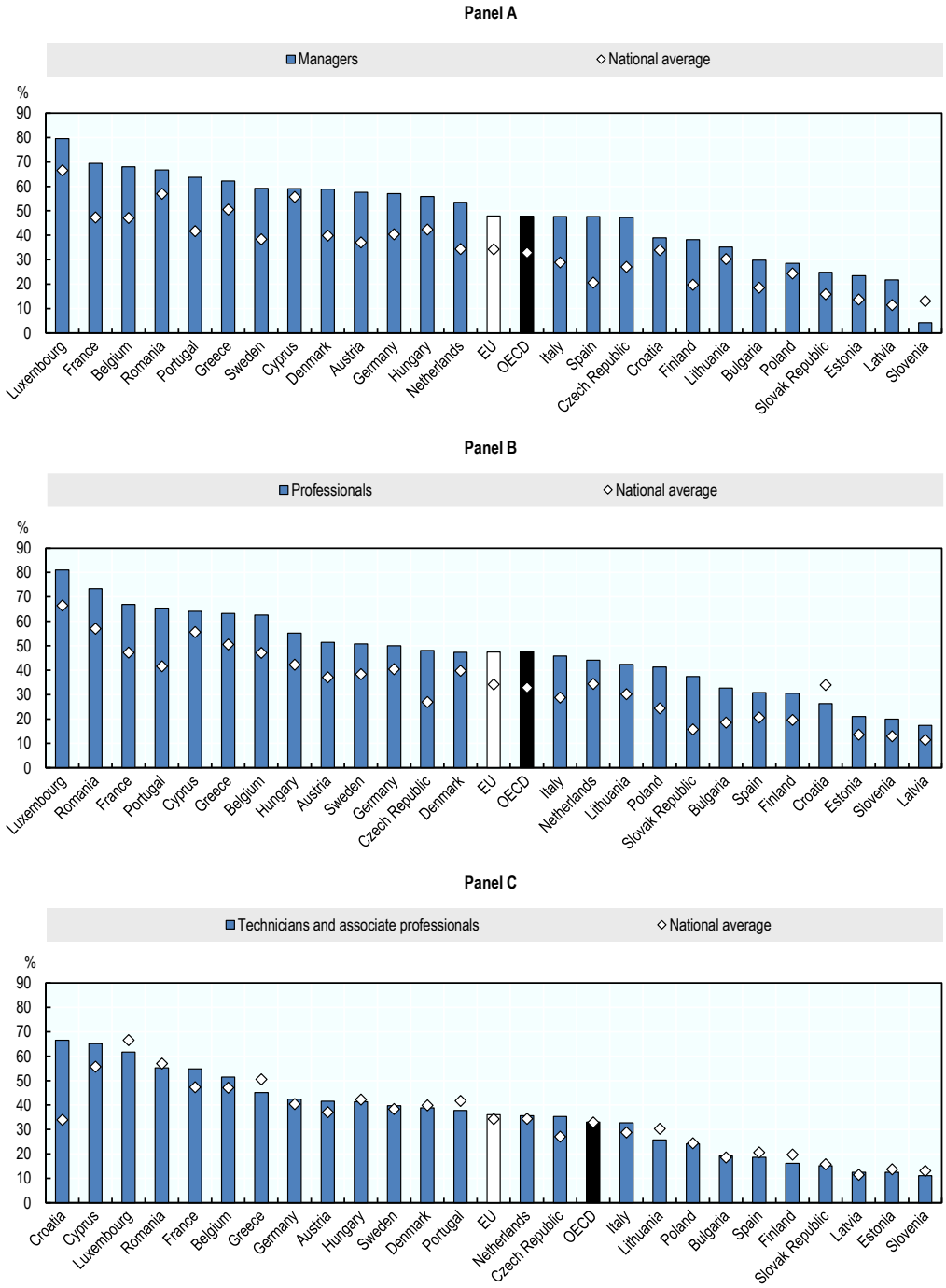
28. Figure 4.2 shows the percentage of online vacancies implicitly or explicitly requiring English language skills in clerical occupations and in sales and service occupations. Panel A in Figure 4.2 suggests that on average across OECD and EU countries 36% and 37% respectively of online vacancies for clerical jobs implicitly or explicitly requiring English language skills. In Cyprus, France, Luxembourg and Romania, more than 60% of online vacancies posted on line for clerical jobs implicitly or explicitly requiring English language skills whereas in Bulgaria, Latvia, Poland, the Slovak Republic, Estonia and Finland less than 20% of online vacancies posted online for clerical jobs implicitly or explicitly requiring English language skills. Panel B in Figure 4.2 suggests that on average across OECD and EU countries 26% respectively of online vacancies for service and sales jobs implicitly or explicitly requiring English language skills.

29. Figure 4.3 indicates that the percentage of online vacancies for skilled agricultural forestry and fishery workers and for craft and related trade workers implicitly or explicitly requiring English language skills is considerably lower than the national average in all European Union countries and the United Kingdom. This is despite the fact that vacancies for workers in these occupations that appear on line are generally quite selected, so online postings for these occupations may be only the ones for positions requiring greater familiarity with technology and potentially to have good communication skills, including the ability to communicate with others in English. On average across OECD and European Union countries only 5% and 7% respectively of online vacancies advertising positions for skilled agricultural forestry and fishery workers implicitly or explicitly requiring English language skills. English skills are slightly more required in vacancies looking for craft and related trade workers: on average across OECD and European Union countries only 16% and 17% respectively of online vacancies advertising positions for these workers implicitly or explicitly requiring English language skills.

30. The percentage of online vacancies implicitly or explicitly requiring English language skills was lowest in vacancies advertising positions for plant and machine operators, assemblers and other elementary occupations. Panel A in Figure 4.4 reveals that, on average, only around 3% and 2% respectively of vacancies posted on line in OECD and European Union countries for positions for plant and machine operators, assemblers required either implicitly or explicitly English language skills. Similarly, Panel B in Figure 4.4 indicates that, on average, only around 6% and 7% respectively of vacancies posted on line in OECD and European Union countries for positions for not otherwise classified elementary occupations required either implicitly or explicitly English language skills. Results presented are in line with results reported by Isphording (2015[24]), and Fabo, Beblavý and Lenaerts (2017[29]), and suggest that a command of English is demanded in positions in the labour market that typically command higher wages and require workers to solve complex analytical and cognitive tasks, like managerial and professional technical positions.

Figure 4.1. The demand for English skills among managers, professionals, technicians, and associate professionals

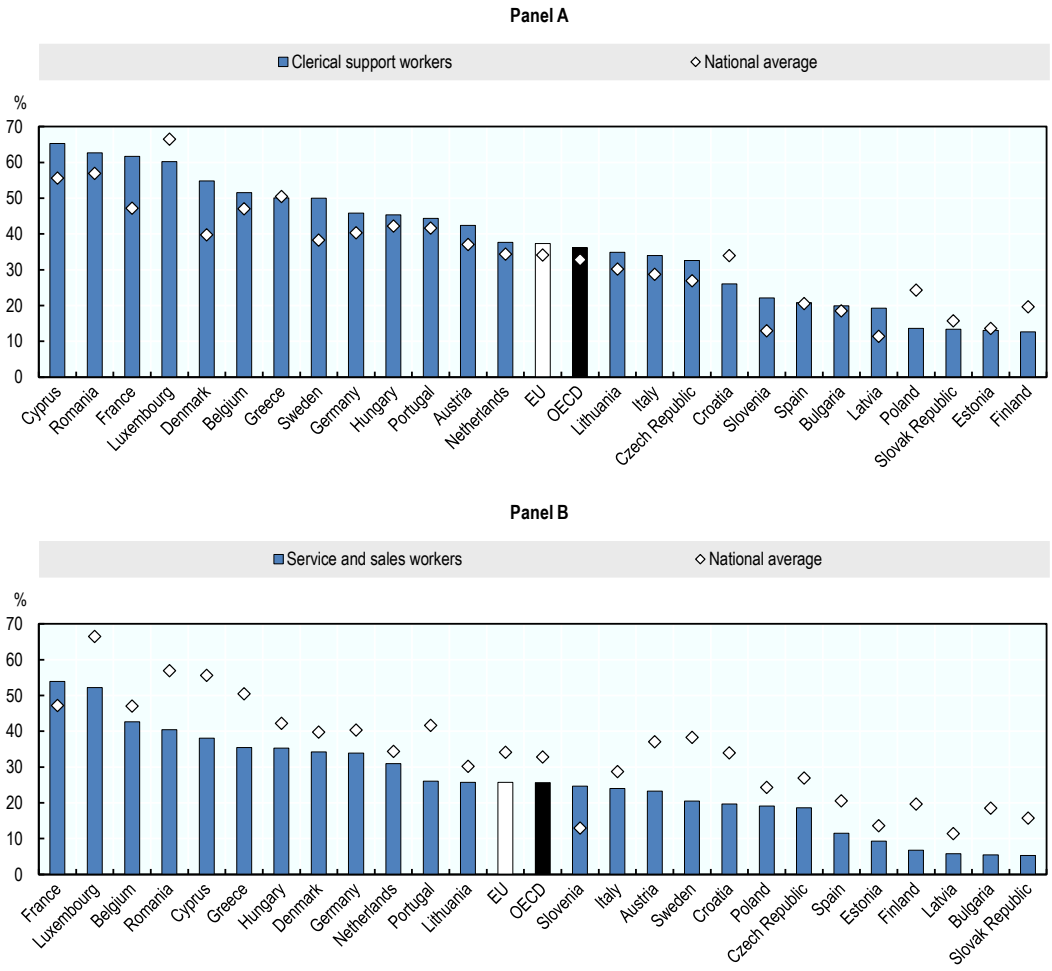
Percentage of online vacancies implicitly or explicitly requiring at least some knowledge of English among managers, professionals, technicians and associate professionals, by country



Note: Countries are sorted in descending order of the number of vacancies explicitly or implicitly requiring English. These are vacancies either specifying English as a required skill in the vacancy text or vacancies that were written in English. Data from the United Kingdom, Ireland and Malta were excluded. "National average" refers to the average in a specific country across all occupational groups.
In the phase of development of the database, some difficulties were encountered in guaranteeing data coverage for Bulgaria, Croatia, Cyprus, Greece, and Luxembourg (Cedefop, 2019[31]).
Source: Web Intelligence Hub's Online Job Advertisement (OJA) release "2021q4" database.

Figure 4.2. The demand for English skills among clerical support workers and service and sales workers

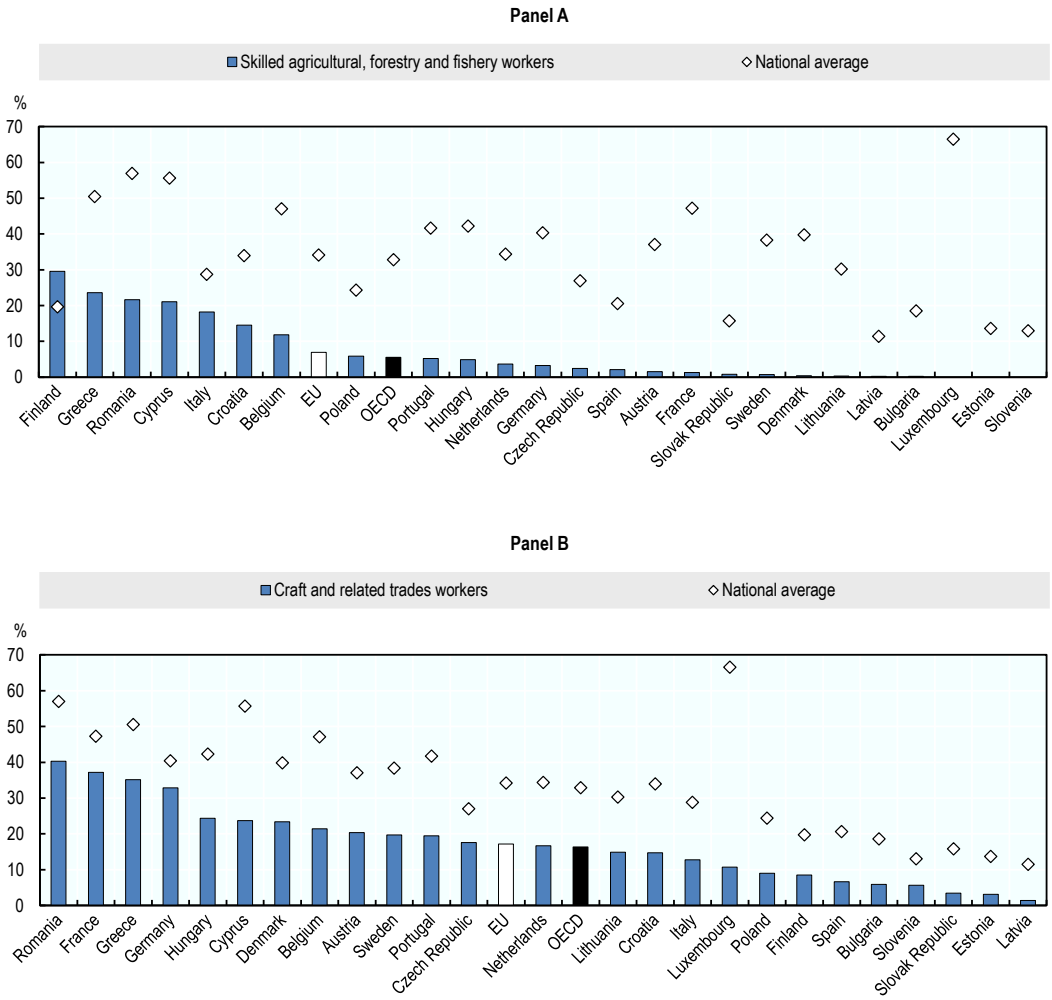
Percentage of online vacancies implicitly or explicitly requiring at least some knowledge of English among clerical support workers and service and sales workers, by country



Note: Countries are sorted in descending order of the number of vacancies explicitly or implicitly requiring English. These are vacancies either specifying English as a required skill in the vacancy text or vacancies that were written in English. Data from the United Kingdom, Ireland and Malta were excluded. "National average" refers to the average in a specific country across all occupational groups.
In the phase of development of the database, some difficulties were encountered in guaranteeing data coverage for Bulgaria, Croatia, Cyprus, Greece, and Luxembourg (Cedefop, 2019[31]).
Source: Web Intelligence Hub's Online Job Advertisement (OJA) release "2021q4" database.

Figure 4.3. The demand for English skills among skilled agricultural, forestry, fishery, craft and related trades workers

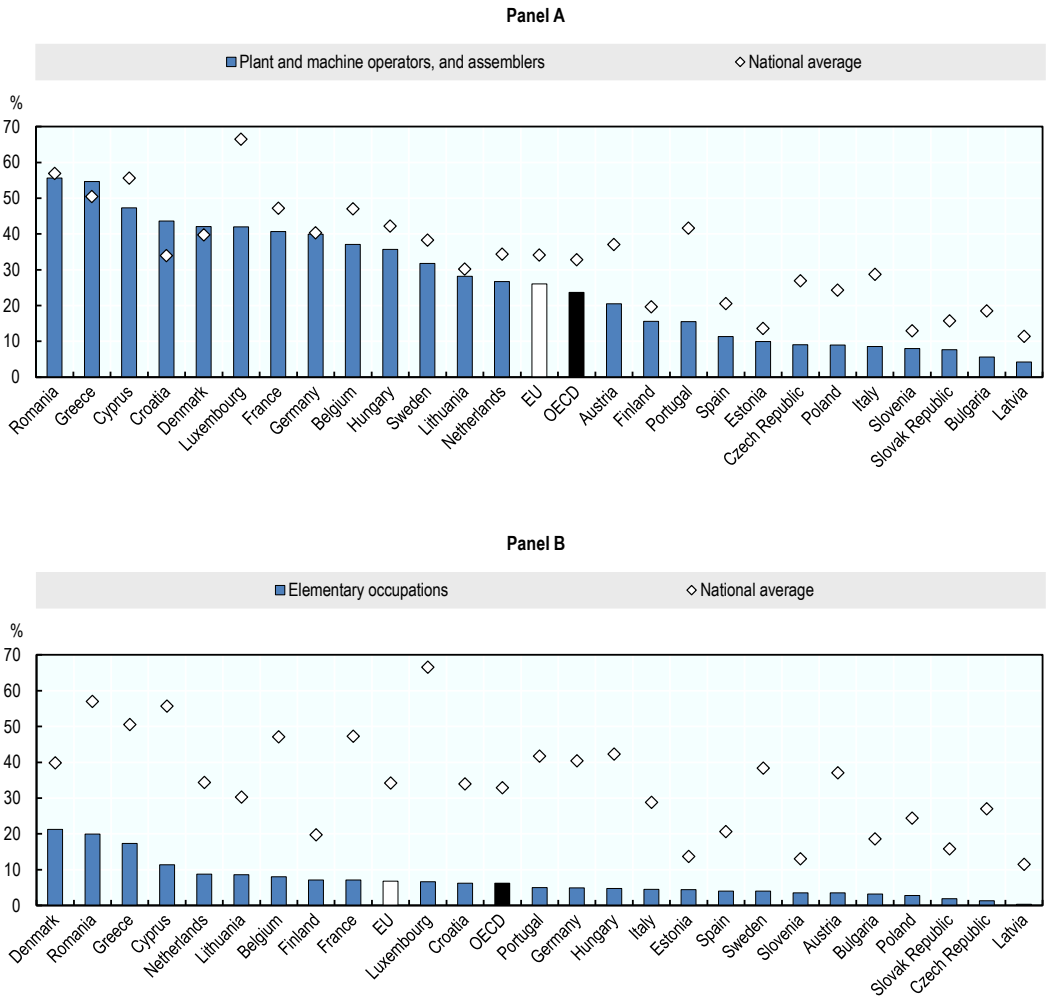
Percentage of online vacancies implicitly or explicitly requiring at least some knowledge of English among skilled agricultural, forestry and fishery workers and among craft and related trades workers, by country



Note: Countries are sorted in descending order of the number of vacancies explicitly or implicitly requiring English. These are vacancies either specifying English as a required skill in the vacancy text or vacancies that were written in English. Data from the United Kingdom, Ireland and Malta were excluded. "National average" refers to the average in a specific country across all occupational groups.
In the phase of development of the database, some difficulties were encountered in guaranteeing data coverage for Bulgaria, Croatia, Cyprus, Greece, and Luxembourg (Cedefop, 2019[31]).
Source: Web Intelligence Hub's Online Job Advertisement (OJA) release "2021q4" database.

Figure 4.4. The demand for English skills among plants and machine operators, assemblers and elementary occupations

Percentage of online vacancies implicitly or explicitly requiring at least some knowledge of English among plants and machine operators and assemblers and among elementary occupations, by country



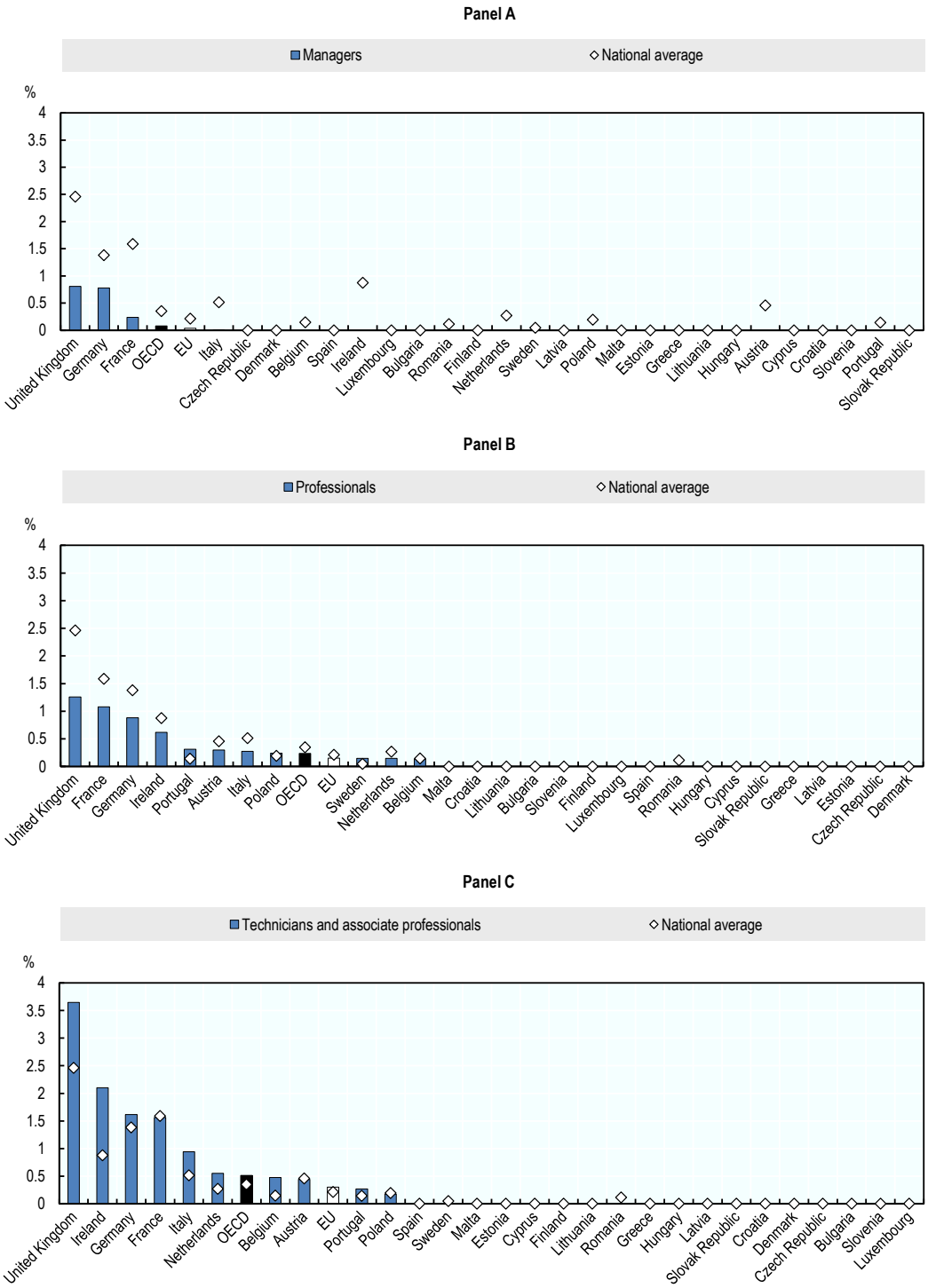
Note: Countries are sorted in descending order of the number of vacancies explicitly or implicitly requiring English. These are vacancies either specifying English as a required skill in the vacancy text or vacancies that were written in English. Data from the United Kingdom, Ireland and Malta were excluded. "National average" refers to the average in a specific country across all occupational groups.
In the phase of development of the database, some difficulties were encountered in guaranteeing data coverage for Bulgaria, Croatia, Cyprus, Greece, and Luxembourg (Cedefop, 2019[31]).
Source: Web Intelligence Hub's Online Job Advertisement (OJA) release "2021q4" database.

31. Figure 4.5 and Figure 4.6 report the results for the percentage of online ads requiring Mandarin Chinese. In this case, the picture is almost reversed compared to English. In fact, Mandarin Chinese is most requested in online vacancies advertising jobs in service and sales occupations, in crafts, plant and machine operators. This could mean that Mandarin Chinese may be requested in jobs that service primarily Chinese migrant communities, cater to Chinese tourists travelling to Europe or be associated with contacting trade partners in China.

32. The country with the highest demand for Mandarin Chinese in practically all the occupation groups is the United Kingdom, followed by France, and Germany. In general, Mandarin Chinese is requested in very few online ads: 2.5% in the United Kingdom, 1.6% in France, 1.4% in Germany and about 1% In Ireland and Italy. These countries experienced in the last decades a huge inflow of Chinese nationals (Plewa and Stermšek, 2017[42]), which can explain a strong demand for a knowledge of Mandarin Chinese, especially in occupations in which large migrant communities are employed or in which contact with China because of trade is intense. Interestingly, despite the large influx of Chinese migrants, very few online vacancies advertised in Spain required a knowledge of Mandarin Chinese.

Figure 4.5. The demand for Mandarin Chinese skills among managers, professionals, technicians, and associate professionals

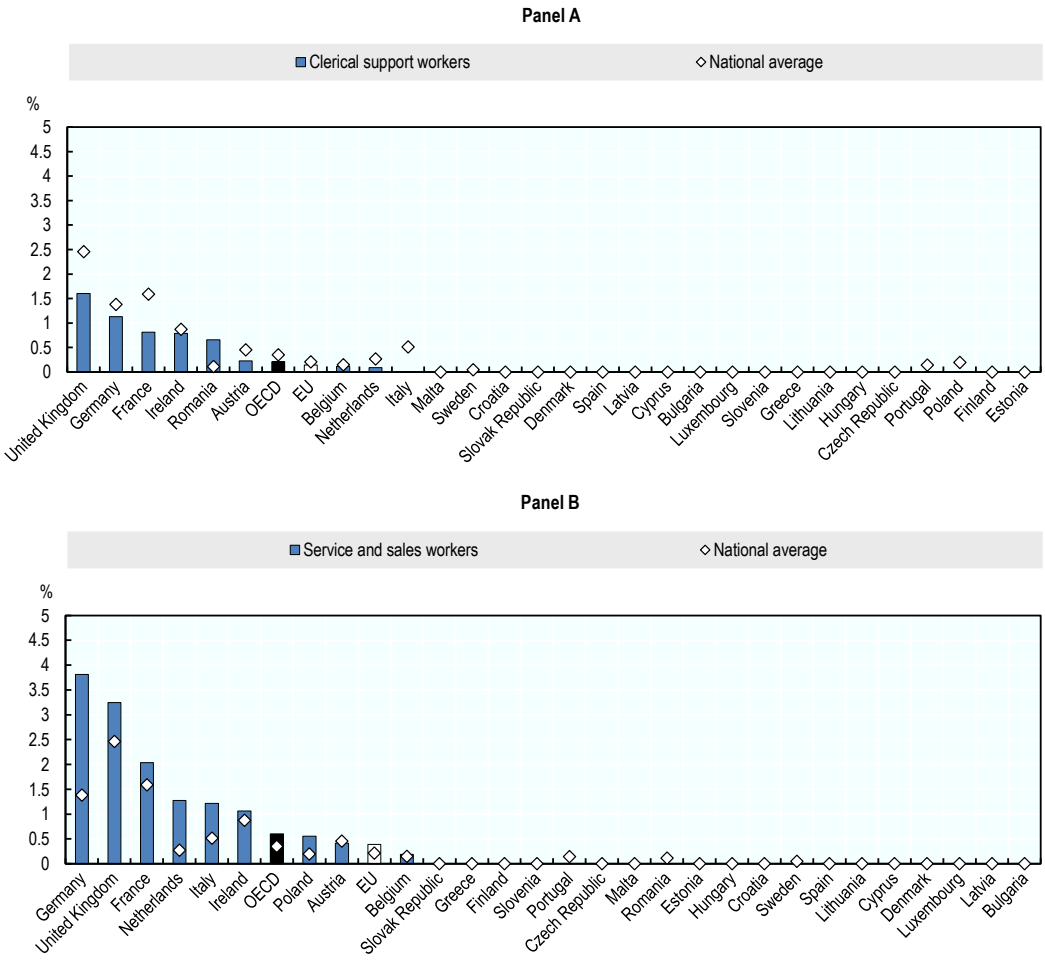
Percentage of online vacancies implicitly or explicitly requiring at least some knowledge of Mandarin Chinese among managers, professionals, technicians, and associate professionals, by country



Note: Countries are sorted in descending order of the number of vacancies explicitly or implicitly requiring Mandarin Chinese. These are vacancies specifying Mandarin Chinese as a required skill in the vacancy text since no vacancies were written in Mandarin Chinese.
Source: Web Intelligence Hub's Online Job Advertisement (OJA) release "2021q4" database.

Figure 4.6. The demand for Mandarin Chinese skills among clerical support workers, and among service and sales workers

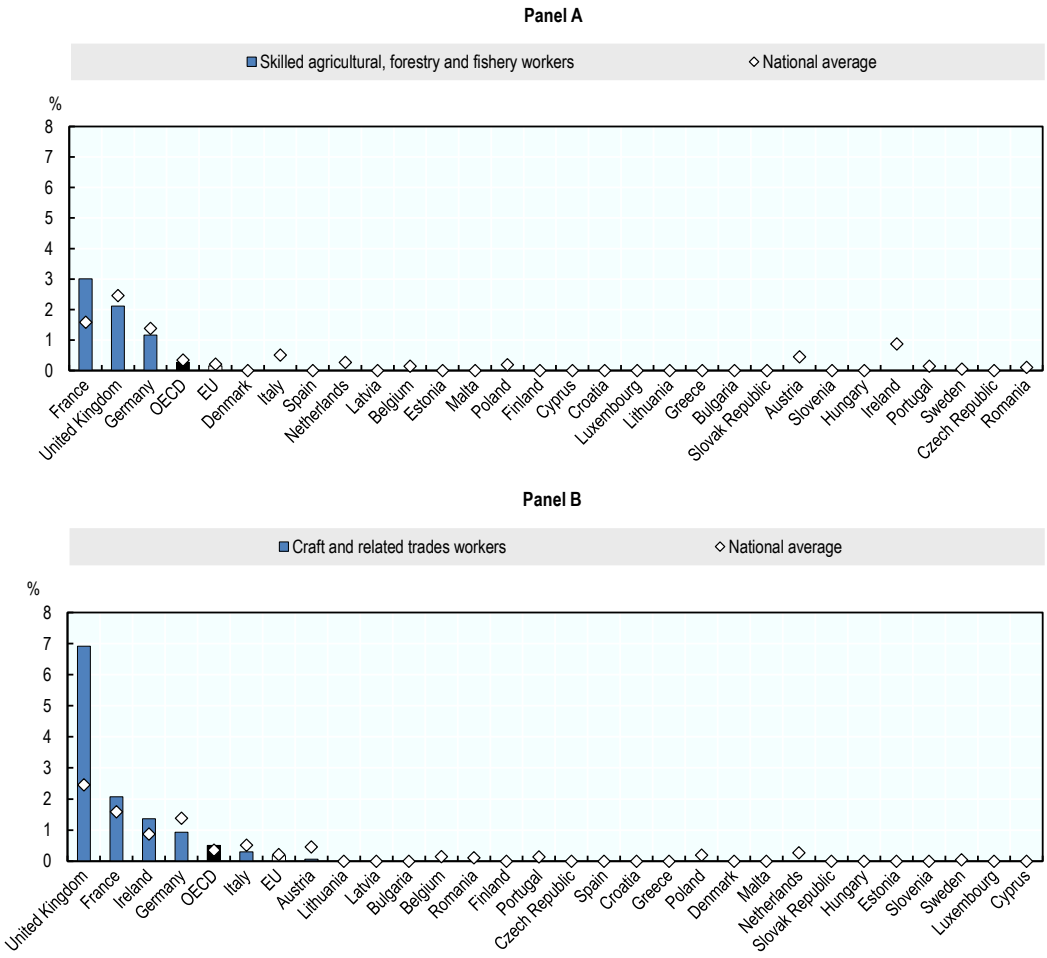
Percentage of online vacancies implicitly or explicitly requiring at least some knowledge of Mandarin Chinese among clerical support workers, and among service and sales workers, by country



Note: Countries are sorted in descending order of the number of vacancies explicitly or implicitly requiring Mandarin Chinese. These are vacancies specifying Mandarin Chinese as a required skill in the vacancy text since no vacancies were written in Mandarin Chinese.
Source: Web Intelligence Hub's Online Job Advertisement (OJA) release "2021q4" database.

Figure 4.7. The demand for Mandarin Chinese among skilled agricultural, forestry, fishery, craft, and related trades workers

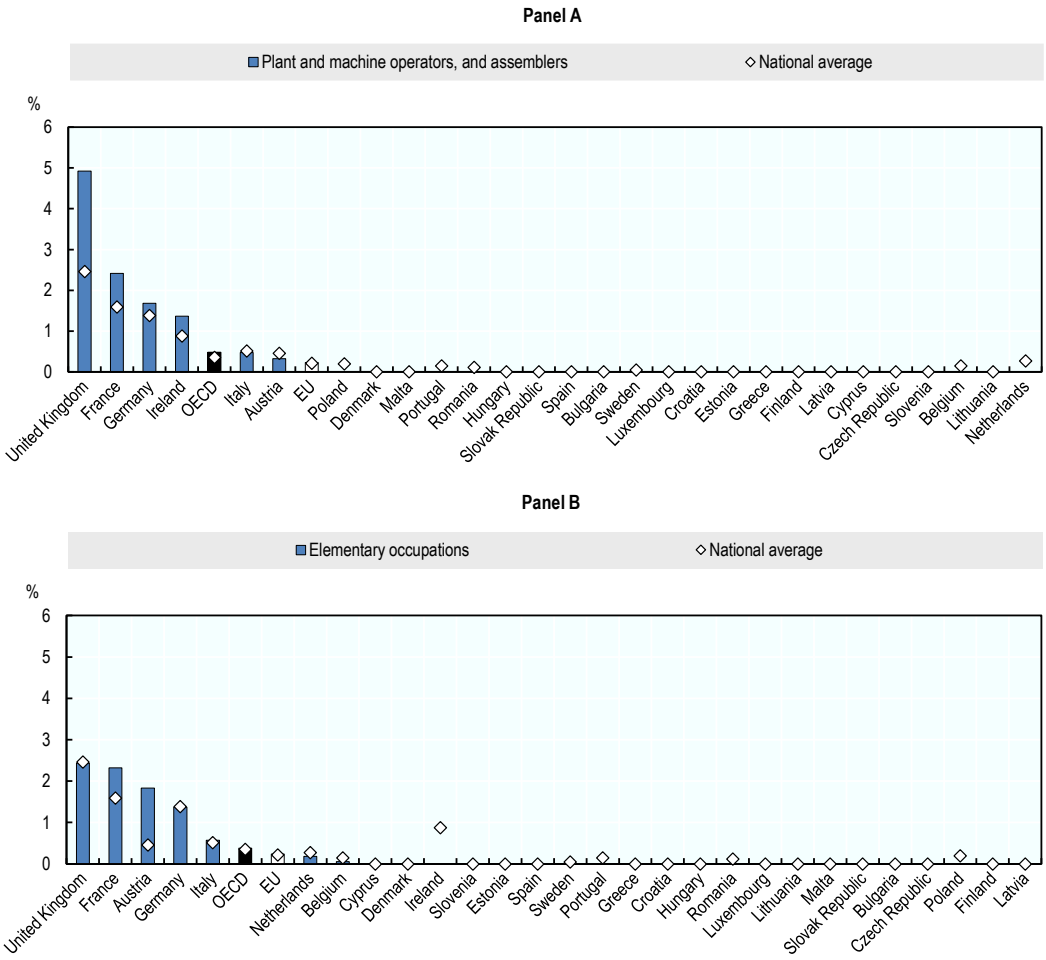
Percentage of online vacancies implicitly or explicitly requiring at least some knowledge of Mandarin Chinese among skilled agricultural, forestry and fishery workers, and among craft and related trades workers, by country



Note: Countries are sorted in descending order of the number of vacancies explicitly or implicitly requiring Mandarin Chinese. These are vacancies specifying Mandarin Chinese as a required skill in the vacancy text since no vacancies were written in Mandarin Chinese.
Source: Web Intelligence Hub's Online Job Advertisement (OJA) release "2021q4" database.

Figure 4.8. The demand for Mandarin Chinese among plant and machine operators, assemblers, and elementary occupations

Percentage of online vacancies implicitly or explicitly requiring at least some knowledge of Mandarin Chinese among plant and machine operators, assemblers, and elementary occupations, by country



Note: Countries are sorted in descending order of the number of vacancies explicitly or implicitly requiring Mandarin Chinese. These are vacancies specifying Mandarin Chinese as a required skill in the vacancy text since no vacancies were written in Mandarin Chinese.
Source: Web Intelligence Hub's Online Job Advertisement (OJA) release "2021q4" database.

33. Results for German, French and Spanish are reported in Annex B and show a pattern similar to the one identified for English: German, French and Spanish tend to be in higher demand in managerial and professional occupations and lower in manual occupations such as plant and machine operators, assemblers, skilled agricultural, forestry and fishery workers. For example, German is widely required for managerial professions in Luxembourg, Belgium and in some East-European countries (i.e. Bulgaria and the Czech Republic), while the demand for French is very high in Luxembourg and less in other countries with the remarkable exception of technicians in Croatia. The knowledge of Spanish is required for managerial professions as well as for clerical, service, sales craft workers and for plant and machine operators and assemblers. In Croatia there is a huge Spanish demand for service and sales workers.

4.2. What skills are demanded alongside language skills

34. Previous sections identify large differences in the demand for language skills across occupations. In particular, online vacancies advertising positions for managers and professionals are considerably more likely to explicitly require at least some knowledge of English and, to a lesser extent, of other European languages such as German, French or Spanish, than other online vacancies advertising positions for other occupational groups. By contrast, Mandarin Chinese is most demanded in service and sales occupations, in craft and related trades occupations, and in job advertising positions for plant and machine operators and assemblers.

35. Table 4.1 identifies, for each occupational group, which skills appear more frequently alongside language skills in online vacancies advertising positions in each broad occupational group. This allows to identify what other forms of human capital complement language skills (or are complemented by language skills). For each occupation at the ISCO 1-digit level, analyses were conducted to identify among the sets of skills included in the text of the online vacancies, which skills best predicted the explicit presence of English, (or German, or Chinese) among the job requirements.

36. Table 4.1 relies on a widely used criterion to evaluate prediction accuracy – the percentage of correctly predicted outcome (Poldrack, Huckins and Varoquaux, 2020[43]; Abbott, 2014[44]). It identifies, for each language analysed – English, German and Mandarin Chinese – the "top predicting" skill and the percentage of online vacancies that were correctly predicted as explicitly specifying language skills based on this skill. A skill was considered to correctly predict a vacancy if its presence among (or absence from) the job requirements of such vacancy was systematically related with the presence (or absence) of a requirement for knowledge of a particular language in the job requirements.[1] Because most vacancies did not include any language skills requirements for a knowledge of Mandarin Chinese and German, the percentage of correctly predicted outcomes for these languages is a valid criterion to identify top predictors, but this indicator cannot be compared across occupations or languages.

37. Table 4.1 reveals important differences in the skills that are most strongly associated with requirements for English, German and Mandarin Chinese. For English, the top predicting skills across the pool of all occupational groups was "business analysis". "Business analysis" was the top predicting skills for an English language requirement in vacancies posted on line advertising positions for technicians and associate professionals, clerical support workers, service and sales workers, assemblers, and for plant and machine operators. This suggests that English is required in jobs that also demand an understanding of business strategy and of the economic context. "Trademarks" and "Search engine optimisation" were the top predicting skills for an English language requirement in vacancies posted on line advertising positions for managers and professionals, signalling the commercial and technological content of positions requiring English proficiency.

38. By contrast, Table 4.1 suggests that for German, in most occupational categories, the top predicting skills of German linguistic requirements were other language skills (Dutch, French, Hungarian and Spanish). This suggests that vacancies requiring German tend to refer to positions in which multiple languages are required, for example positions requiring extensive communication with other countries because of trade or tourism. When all vacancies were considered, the top predicting skills for a German language requirement in vacancies posted on line was "language teaching methods", an indication that

[1] For each linguistic skill, two possible values of the percentage of correctly predicted vacancies were calculated and the highest between the two was retained. The first was the value calculated under the assumption of a positive association between predicting skills and target language skills (i.e. that when a certain predicting skill was included in a vacancy, target language linguistic requirements were more likely to occur). The second was the value calculated under the assumption of a negative association between predicting skills and the target language skills (i.e. the absence of predicting skills would be associated with the presence of linguistic skills requirements and the presence of predicting skills would be associated with the absence of linguistic skills requirements). In practice, top predicting skills were all positively related to linguistic skills requirements.

German is an especially strong requirement in positions of German language teachers. “Language teaching methods” was the top predicting skill for a German language requirement in vacancies for professionals, which comprised the largest group overall in which German was required and teachers are an especially large group of professionals.

39. Finally, Table 4.1 indicates that the sets of skills that best predicted Mandarin Chinese linguistic requirements tended to be very occupation-specific skills: for example “control kiln firing” was the skill most associated with Chinese in vacancies posted on line for professionals whereas “babysitting” was the skill most associated with Chinese in vacancies posted on line for elementary occupations. For managers, the skill that best predicted Mandarin Chinese linguistic requirements was “take food and beverage orders from customers”, which could indicate that a relatively large part of managerial positions requiring Mandarin Chinese involve managing small establishments (like restaurants) in which the manager is also directly involved in service delivery.

Table 4.1. Skills that best predict an explicit knowledge of English, German and Mandarin Chinese, by occupation (ISCO 1-digit) category

Occupation	Top predicting skill			Percentage of correctly predicted ads		
	English	German	Chinese	English	German	Chinese
Managers	trademarks	Spanish	take food and beverage orders from customers	78.2	97.1	99.5
Professionals	search engine optimisation	language teaching methods	control kiln firing	76.9	97.7	99.2
Technicians and associate professionals	business analysis	Dutch	decision support systems	75.7	98.5	98.3
Clerical support workers	business analysis	Hungarian	aerodynamics	71.6	98.1	99.2
Service and sales workers	business analysis	Dutch	climbing equipment	77.8	98.7	98.2
Skilled agricultural, forestry and fishery workers	precision measuring instruments	NA	aerodynamics	99.1	NA	98.8
Craft and related trades workers	material mechanics	legal studies	ski	81.8	99.6	98.2
Plant and machine operators, and assemblers	business analysis	French	Android	82.8	99.1	98.2
Elementary occupations	robotic components	advocate for others	babysitting	94.9	99.9	98.5
All occupations combined	business analysis	language teaching methods	decision support systems	78.6	98.3	98.7

Note: In the analyses reported in this table, vacancies were defined as requiring English, German and Mandarin Chinese only if they explicitly required that language in the vacancy text (independently of the language in which the vacancy was written). No top predicting skill for German were found in category Skilled agricultural, forestry and fishery workers due to a limited number of vacancies requiring German in that category.
Source: Web Intelligence Hub’s Online Job Advertisement (OJA) release “2021q4” database.

4.3. Language skills and employment conditions

40. This section investigates if an implicit or an explicit demand for specific language skills (i.e., English, German and Mandarin Chinese) in the online job vacancies was associated with greater labour market returns in terms of job contract. Since the OJA database contains 162 million ads, a random sample of vacancies that were representative at the regional level (NUTS-2) was selected to maintain the computations manageable. In principle, this means that estimates are less precise than would have been the case had all vacancies been used in the analysis (even though, in practice, the number of ads in the sample is very large). The extraction process was done in two steps. In the first step, a random sample of about 100 000 vacancies for each language was selected and, in a second step, a further random sample of about 1.5 million vacancies was added to the final sample. The first step ensured that the sample contained enough vacancies for each language since few vacancies required Mandarin Chinese or German compared to English. The second step enlarged the overall sample and ensured generalisability. In the extraction process, the condition of not having missing values on the following variables: occupation, industry, country, region (NUTS-2) and contractual condition was imposed. This condition led to a reduction in the population of vacancies that could be sampled: the percentage of vacancies that were excluded due to missing information amounted to 34.3%.

41. The analytical strategy was based on a set of nested models aimed at understanding the association between the presence of language skills requirements and contractual conditions and the potential mediating role of occupation (ISCO 1-digit) and industry (NACE 1-digit). In order words, analyses allow to estimate across all labour markets if vacancies containing language skills requirements are more likely to be for permanent positions and if this association is due to the fact that permanent positions are more likely to be offered in industries and occupations in which language skills are most required. In other words, results presented in Table 4.2 allow to identify economy wide associations as well as the strength of associations within occupations and industries. Table 4.2 presents three different sets of models: the first contains as controls work experience, the language in which the vacancy was written and country fixed effects, the second additionally controls for industry fixed effects and the last model additionally controls for occupation fixed effects.

42. Table 4.2 shows the percentage point change in the proportion of a vacancy offering a permanent rather than a non-permanent contract associated with explicit or implicit linguistic requirements. Online vacancies requiring English and German are more likely to offer positions with a permanent contractual arrangement whereas positions for which Mandarin Chinese is required are more likely to be for positions that do not offer a permanent contract. The strength of the association between language requirements and the likelihood that a vacancy will advertise a permanent contract is weaker when occupations as well as industry fixed effects are included, although occupation appears to be the primary mediation mechanism.

43. For example, a vacancy requiring English was three-percentage points more likely to offer a permanent contract than other vacancies. However, when controlling for occupational category this difference was just 0.6 percentage points. Similarly, the presence of German in a vacancy was associated with a 7.5 percentage point higher probability that a vacancy advertised a position with a permanent contract but when comparing vacancies advertised for positions with different language requirements but for the same occupational category this difference was just 4.5 percentage points. By contrast, the presence of Mandarin Chinese in a vacancy was associated with a four-percentage point lower probability that a vacancy advertised a position with a permanent contract but when comparing vacancies advertised for positions with different language requirements but for the same occupational category this difference was just one percentage point.

44. Given these results, to deepen the discussion of the influence of the demand of English, German and Chinese, Figure 4.9 highlights differences in the likelihood that a vacancy advertised permanent positions as a function of language skills requirements among different occupations. Results suggests that

English skills requirements are associated with a 'quality of contractual conditions premium' only among managers and professionals, whereas a German skills requirement was associated with a higher likelihood that a vacancy advertised job opportunities with permanent contracts in almost all the occupational categories with the exception of "Craft and related trades workers" and "Elementary occupations". Occupational differences in the likelihood that jobs advertised on line will be for permanent positions depending on the presence of Mandarin Chinese skills requirements are mixed: such requirement was associated with an increased likelihood among managers and associate professionals but a lower likelihood among many other professional groups.

Table 4.2. The association between language skills and the probability that a vacancy will offer a permanent position

Changes in the likelihood that a vacancy will offer a permanent position as a function of the presence in the vacancy of a language requirement

	Model 1			Model 2			Model 3		
English	0.033***			0.029***			0.006***		
	(0.001)			(0.001)			(0.001)		
German		0.075***			0.065***			0.045***	
		(0.002)			(0.002)			(0.002)	
Mandarin Chinese			-0.044***			-0.034***			-0.010***
			(0.002)			(0.002)			(0.002)
Other controls	YES			YES			YES		
Industry	NO			YES			YES		
Occupation	NO			NO			YES		
Observations	660 183	717 062	818 030	660 183	717 062	818 030	660 183	717 062	818 030
R^2	0.113	0.206	0.192	0.127	0.223	0.207	0.138	0.233	0.217

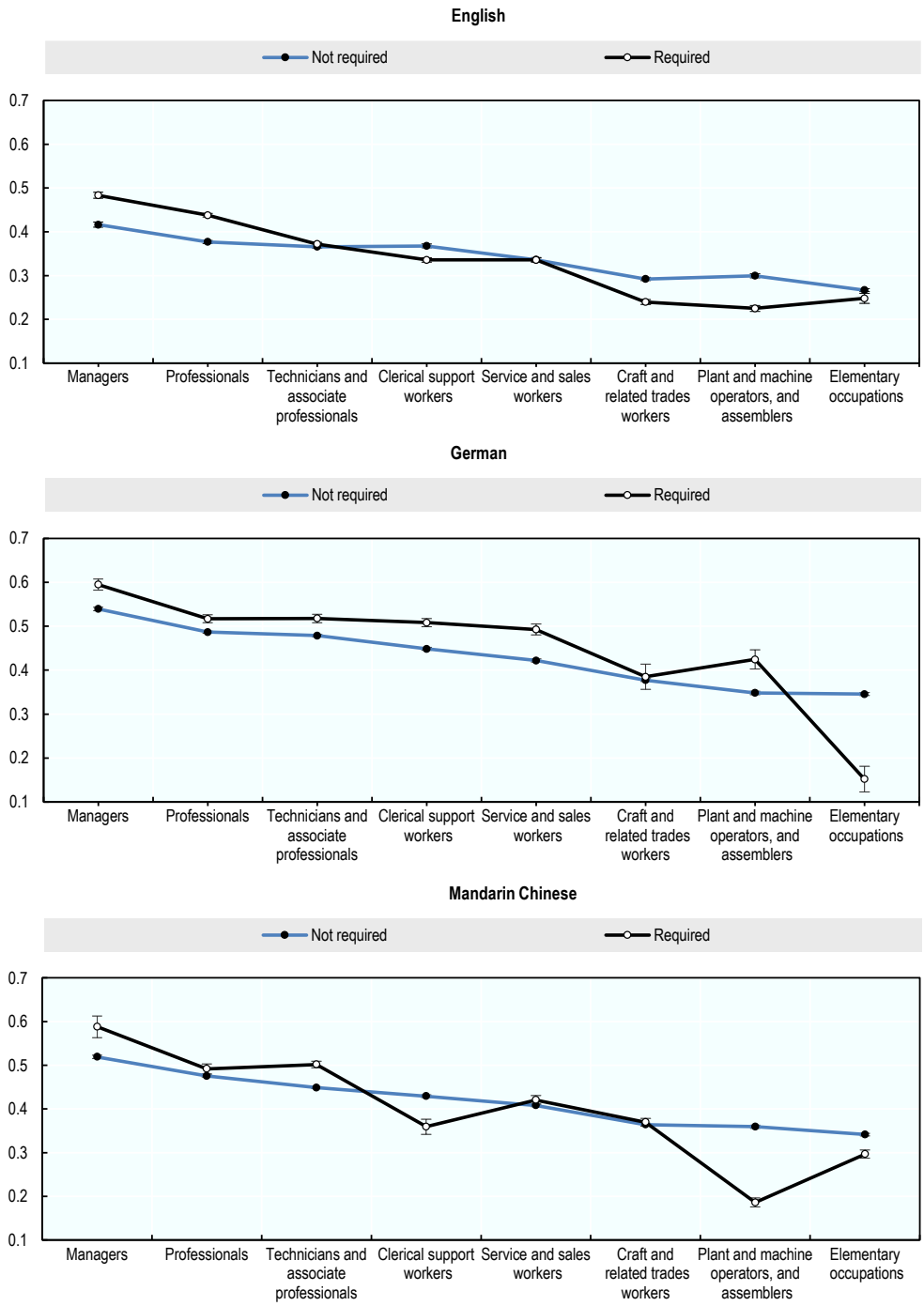
Note: Parameters derived from three sets of OLS regression models in which estimated changes in the likelihood that a vacancy offered a permanent position were regressed on the presence of English, German and Mandarin Chinese. Data from the United Kingdom, Ireland and Malta were excluded in Models with English. Data from Austria and Germany were excluded in Models with German. Robust standard errors in parentheses.

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Source: Web Intelligence Hub's Online Job Advertisement (OJA) release "2021q4" database.

Figure 4.9. Heterogeneity across occupations in the association between language skills requirements and the likelihood that a vacancy will offer a permanent position

Predicted probabilities of having a permanent position and respective confidence intervals from OLS models considering the interaction between foreign languages (English, German and Mandarin Chinese) and occupational groups



Note: Parameters derived from nine sets of OLS regression models in which, for each major occupational group, estimated changes in the likelihood that a vacancy offered a permanent position were regressed on the presence of English, German, and Mandarin Chinese. Data from the United Kingdom, Ireland and Malta were excluded in Models with English. Data from Austria and Germany were excluded in Models with German. Robust standard errors in parentheses.

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Source: Web Intelligence Hub's Online Job Advertisement (OJA) release "2021q4" database.

5. Conclusions

45. The analyses presented in this work indicate that Europe remains a linguistically diverse labour market: individuals who want to find employment in a specific country have to be able to master the official language/s used in that national context. Language remains an important 'intangible' barrier to the movement and allocation of workers in Europe. As a result, it is possible that some economic sectors may suffer from an oversupply of qualified workers to perform specific tasks while other areas may face an undersupply of such workers because workers lack the specific language skills needed to be integrated in another linguistic context. Language learning is an important priority in the European Union, with significant investments being dedicated to language teaching and learning in education and vocational training as well as to promoting language learning through youth mobility.

46. Promoting language learning is not only important to promote workers' mobility but is also an important way for economies to reduce barriers to international trade facilitating collaboration across linguistic boundaries. Results presented in this work indicate that on average across European Union member countries and the United Kingdom, over one in ten vacancies that were posted on line in 2021 explicitly demanded language skills. In France and Germany this share was as high as 45% and 32% respectively but at least some knowledge of a language other than the language in which the vacancy was drafted was required in over 15% of all vacancies also in Austria, Belgium, Denmark, Hungary, Italy, the Netherlands, Portugal and Sweden. Because these estimates are derived based on vacancies that were posted on line, they reflect the demand for workers who are likely to have access to digital technologies and use them in their job search. Such selection might lead to an overestimation of the demand for language skills since such demand is likely to be more likely to capture workers with greater skills. At the same time, it is possible that in many contexts in which language skills are essential to perform a job, employers will assume that prospective workers will possess such skills and use the limited space available in the vacancy text to spell out other essential or desirable skills. Such cases might lead to an underestimation of the demand for language skills.

47. Despite a marked linguistic heterogeneity, analyses presented suggest that a knowledge of English confers distinct advantages in European labour markets, especially in managerial, professional and associate professional occupations. A knowledge of English was the sixth most demanded skill in vacancies posted on line by employers in 2021. On average across European Union member countries (excluding Malta and Ireland), 22% of all vacancies posted on line in 2021 either explicitly required at least some knowledge of English or implicitly required it since the vacancy text was directly written in English. In France this figure was almost one in two (48%) and was over one in five in Austria, Belgium, Cyprus, Germany, Denmark, Greece, Croatia, Hungary, Luxembourg, the Netherlands, Portugal, Romania and Sweden. English appears to be the only language that approximate a *lingua franca* in Europe. A knowledge of other European languages such as French, German and Spanish or languages that are widely used in the world such as Mandarin Chinese are not equally demanded in European labour markets. A knowledge of German, Spanish, French and Mandarin Chinese was explicitly demanded in only between 1% and 2% of all vacancies in European Union member countries or the United Kingdom.

48. Detailed analyses on language skills requirements in different occupations suggest that the ability to use English was especially demanded in occupations requiring workers to perform complex cognitive tasks such as managers and professionals and an explicit or implicit knowledge of English was most

demanded in occupations requiring skills related to an understanding of business strategy. A knowledge of Mandarin Chinese was demanded especially in occupations that require less complex cognitive tasks. In contrast, German was relatively highly demanded in vacancies for jobs that also required a knowledge of other languages or in teaching positions, suggesting that it is demanded in jobs requiring multiple languages (e.g. in the tourism and hospitality industry) and in the teaching of the German language.

49. In the European Union, where multilingualism is explicitly recognised as critical to realising a vision of Europe that includes mobility, intercultural understanding and economic prosperity, young people are generally exposed at school to a second language from primary school and an additional language in secondary school and language education is a core component of school curricula. The most recent data from Eurostat on language learning collected in 2015 indicates that 99% of all students in lower secondary school were learning at least one 'foreign' language, defined in most countries, as the official language of instruction (Eurostat, 2017[45]) and as many as 59% of students were learning two foreign languages or more. English was the most studied language: 93% studied English; 34% studied French; 23% studied German; 14% studied Spanish; 3% studied Russian and 1% studied Italian.

50. Such efforts have translated into high levels of youngsters reporting having at least some levels of proficiency in a foreign language. In 2016, the year with the most recent available data, only around 19% of 25- to 34-year-olds in the European Union reported that they did not know any 'foreign language'. This share was higher among older cohorts and was highest among individuals between the age of 55 and 64: 43% of respondents in this age group reported not knowing any 'foreign language'. Overall, across the European Union 32% of individuals reported not knowing any foreign language. A knowledge of foreign languages was higher among individuals with higher levels of educational attainment, those who were employed and, especially, among individuals working in professional, managers and associate professional roles. For example, 82.5% of individuals in European Union countries in 2016 who had completed a tertiary level of education reported that they knew at least one foreign language whereas only around 42% of those who had not completed an upper secondary degree did (Eurostat, n.d.[46]).

51. As countries grapple with tight labour market conditions and a shortage of skilled workers, some politicians and business leaders have argued that adopting English as an official language or adopting English as the official language in certain workplace settings could ease labour market shortages and allow countries to fill positions with qualified workers from other linguistic communities (Oltermann, 2023[47]). However, this could result in the loss of a diversity that is strongly valued by the European Union as an essential part of its democracy, resulting in its motto "Unity in Diversity". Our data show that while English is emerging as a *lingua franca* with the potential of aggregating the European labour market, national and local languages retain a key role. The large majority of job ads are not published in English, but in the national languages of each country's labour market. In addition, local languages like Basque and Welsh are demanded in hundreds of thousands of ads.

52. An important limitation of the study is that it is not possible, using information from job vacancies, to assess the level of language proficiency requested. Although it is possible that some prospective employers specify in the text of the vacancy a minimum or desired level of language proficiency, information on the required level of proficiency is noisy and is present only in few vacancies. Therefore, analyses presented simply considered if a vacancy required at least some knowledge of a specific language either explicitly, because it mentioned a linguistic requirement in the vacancy text, or implicitly, because the vacancy was written in that language (even though it may be non-official language in the country in which the position was expected to be filled). This is an important limitation because the literature indicates that the earning differentials associated with language skills are considerable but vary according to a worker's level of proficiency (Di Paolo and Tansel, 2015[48]; Liwiński, 2019[25]; Stöhr, 2015[49])

53. A second limitation of the study is that no estimates were developed to assess the wage returns associated with language skills. This was due to the fact that except for the United Kingdom in which a large number of vacancies contains information on the wages offered by prospective employers, in most

other countries information on prospective wage is missing from a large majority of job vacancies (because it was not mentioned in the vacancy text). The literature on the wage returns associated with language proficiency indicate that these are large but depend on the specific language workers are able to operate in and the country in which they work. For example, in a large review on the wage returns to language skills in European countries suggest that earning differentials associated with language skills range between 6 and 50% (Ginsburgh and Prieto-Rodriguez, 2011[22]).

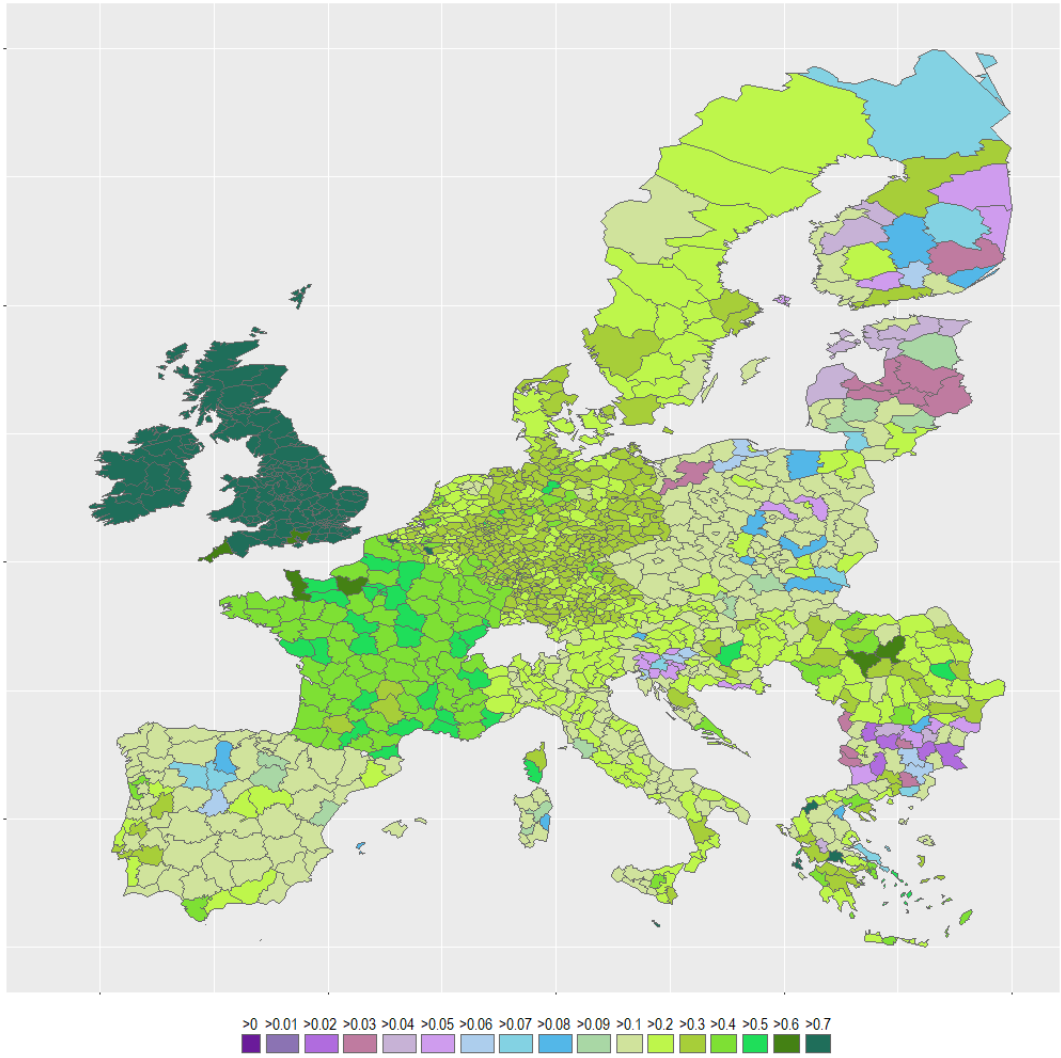
54. It is possible that in the future, artificial intelligence-(AI) powered machine translation tools will ease the possibility for individuals with limited linguistic proficiency to live and work in other countries in Europe breaking down some linguistic barriers in the labour market, especially in some occupations. Machine translation technologies today can in fact translate some texts with a high level of accuracy. At the same time, the quality of translations produced by AI remains variable and depends on the algorithms being used by the language models, the quantity, quality, and variety of the translations used to train the machine learning algorithms that are at the basis of AI machine translation tools as well as the complexity of the text that is translated. Furthermore, although AI machine translation tools produce translations of reasonable quality for written text, challenges related to real time synchronous interpretation with the added challenges related to speech recognition put AI realistically in the future (Borgonovi, Hervé and Seitz, 2023[7]).

55. Technological advances shift the boundaries of what digital mediators can do. By doing so, they change the opportunity cost for individuals to invest in language skills but also, potentially, of what specific aspects of language they should acquire. Should AI make significant progress in facilitating inter-linguistic understanding, it is possible that individuals put more and not less efforts in language learning, in order to be able to understand and use the cultural significance of languages in their work and social exchanges. Moreover, as the use of English becomes widespread among non-native users with a diverse range of proficiency and ability to use the language productively and/or receptively in its written and oral form, a unique skill will be to be able to make the most of communication with such diverse group of users.

Annex A. Robustness analysis on the regional distribution of the demand for English

Figure A A.1. The unweighted regional distribution of online job vacancies requiring at least some knowledge of English in 2021, by NUTS-3 region

Proportion by NUTS-3 regions, 2021



Note: The tables underlying all the charts in this paper are available in the GitHub repository created by Marconi and Vergolini (2022[37]).
Source: Web Intelligence Hub's Online Job Advertisement (OJA) release "2021q4" database.

Annex B. Occupational differences in the demand for language skills

Table A B.1. The demand for French skills among managers, professionals, technicians, and associate professionals

Percentage of online vacancies explicitly or implicitly requiring at least some knowledge of French among managers, professionals, technicians and associate professionals in 2021, by country

	Percentage of online job vacancies requiring French skills			
	Managers	Professionals	Technicians	**National average**
Austria	0.086	0.036	0.265	0.118
Bulgaria	0.020	0.433	0.689	0.295
Croatia	0.388	0.165	50.007	15.096
Cyprus	0.120	0.142	0.349	0.159
Czech Republic	0.005	0.677	0.670	0.638
Denmark	0.013	0.028	0.022	0.019
Estonia	0.010	0.022	0.012	0.010
EU	2.066	2.856	4.824	3.347
Finland	0.047	0.041	0.056	0.044
Germany	1.183	0.608	0.771	0.647
Greece	0.148	0.281	0.690	0.615
Hungary	0.065	0.304	0.167	0.292
Ireland	1.550	1.674	0.691	1.296
Italy	2.918	2.366	2.032	2.132
Latvia	0.000	0.006	0.000	0.003
Lithuania	0.004	0.004	0.003	0.003
Luxembourg	33.205	51.719	57.469	53.895
Malta	0.081	0.056	0.000	0.029
Netherlands	2.322	1.498	0.757	0.916
OECD	2.432	3.344	3.350	3.269
Poland	0.682	1.458	0.930	0.844
Portugal	4.677	5.710	2.884	4.091
Romania	1.470	2.313	0.547	0.978
Slovak Republic	0.235	0.256	0.407	0.356
Slovenia	0.033	0.018	0.000	0.009
Spain	2.172	1.279	1.070	1.044
Sweden	0.213	0.305	0.123	0.147
United Kingdom	1.497	1.942	1.325	1.521

Note: Countries are sorted alphabetically. Percentage of vacancies either specifying French as a required skill in the vacancy text or vacancies that were written in French. Data from France and Belgium were excluded. “National average” refers to the average in a specific country across all occupational groups.
Source: Web Intelligence Hub’s Online Job Advertisement (OJA) release “2021q4” database.

Table A B.2. The demand for French skills among other occupations

Percentage of online vacancies explicitly or implicitly requiring at least some knowledge of French among clerical support workers, service and sales workers, skilled agricultural, forestry and fishery workers, craft and related trades workers, plant and machine operators and assemblers, and elementary occupations, by country

	Percentage of online job vacancies requiring French skills						
	Clerical	Service	Agriculture	Craft	Plant	Elementary	**National average**
Austria	0.075	0.137	0.000	0.149	0.099	0.071	0.118
Bulgaria	0.083	0.075	0.000	0.109	0.019	0.122	0.295
Croatia	0.366	3.069	0.000	0.113	0.103	0.106	15.096
Cyprus	0.000	0.125	0.000	0.000	0.000	0.186	0.159
Czech Republic	0.021	0.016	0.000	0.010	2.821	0.009	0.638
Denmark	0.020	0.020	0.000	0.006	0.007	0.024	0.019
Estonia	0.000	0.007	0.000	0.000	0.000	0.000	0.010
EU	2.813	3.556	2.772	3.531	2.247	3.534	3.403
Finland	0.132	0.053	0.000	0.006	0.010	0.041	0.044
Germany	0.819	0.305	0.035	0.109	0.740	0.722	0.647
Greece	0.661	0.849	0.575	1.251	0.776	1.939	0.615
Hungary	1.062	0.302	0.000	0.100	0.169	0.261	0.292
Ireland	1.529	1.010	0.076	1.577	0.050	0.525	1.296
Italy	5.269	1.796	11.950	0.685	0.487	0.888	2.132
Latvia	0.000	0.000	0.000	0.000	0.012	0.000	0.003
Lithuania	0.000	0.006	0.000	0.000	0.000	0.000	0.003
Luxembourg	44.864	74.498	55.769	80.183	48.818	79.348	53.895
Malta	0.000	0.000	0.000	0.000	0.000	0.000	0.029
Netherlands	0.910	0.524	0.089	0.224	0.171	0.061	0.916
OECD	3.320	4.071	3.300	4.189	2.663	4.160	3.269
Poland	1.113	0.332	0.000	0.278	0.001	0.003	0.844
Portugal	9.220	3.335	0.258	1.859	0.257	0.638	4.091
Romania	0.234	0.258	0.000	0.230	0.233	0.631	0.978
Slovak Republic	0.586	0.243	0.267	0.376	0.212	0.733	0.356
Slovenia	0.000	0.029	0.000	0.000	0.000	0.000	0.009
Spain	1.832	0.932	0.126	0.190	0.222	0.673	1.044
Sweden	0.025	0.014	0.000	0.004	0.004	0.008	0.147
United Kingdom	1.580	1.091	0.151	0.967	1.060	1.425	1.521

Note: Countries are sorted alphabetically. Percentage of vacancies either specifying French as a required skill in the vacancy text or vacancies that were written in French. Data from France and Belgium were excluded. "National average" refers to the average in a specific country across all occupational groups.
Source: Web Intelligence Hub's Online Job Advertisement (OJA) release "2021q4" database.

Table A B.3. The demand for German skills among managers, professionals, technicians, and associate professionals

Percentage of online vacancies explicitly or implicitly requiring at least some knowledge of German among managers, professionals and technicians and associate professionals in 2021, by country

	Percentage of online job vacancies requiring German skills			
	Professionals	Technicians	Professionals	**National average**
Belgium	11.336	9.708	8.843	7.403
Bulgaria	9.112	6.835	6.508	5.671
Croatia	0.427	0.433	49.672	15.175
Cyprus	0.401	0.632	1.148	0.884
Czech Republic	5.516	4.138	6.292	4.222
Denmark	2.312	0.073	0.059	0.305
Estonia	0.381	0.774	1.462	0.600
EU	3.801	3.163	5.164	3.305
Finland	0.118	0.125	0.204	0.210
France	2.365	1.873	1.539	1.238
Greece	1.119	1.918	2.516	2.149
Hungary	10.964	8.029	7.617	6.526
Ireland	1.980	1.397	1.068	1.387
Italy	2.264	1.578	0.997	1.217
Latvia	0.571	1.278	1.391	0.970
Lithuania	2.440	0.052	1.376	1.002
Luxembourg	21.031	17.455	22.519	17.689
Malta	0.243	0.225	0.281	0.321
Netherlands	3.380	2.115	1.749	1.700
OECD	3.977	3.250	3.390	2.854
Poland	4.481	5.529	4.523	4.306
Portugal	4.781	4.300	3.993	4.223
Romania	3.184	4.371	1.654	2.078
Slovak Republic	0.336	2.916	1.296	1.084
Slovenia	2.222	1.277	0.928	0.728
Spain	2.631	1.394	1.110	1.033
Sweden	1.431	0.641	0.356	0.516
United Kingdom	1.861	1.674	1.355	1.429

Note: Countries are sorted alphabetically. Percentage of vacancies either specifying German as a required skill in the vacancy text or vacancies that were written in German. Data from Austria and Germany were excluded. "National average" refers to the average in a specific country across all occupational groups.
Source: Web Intelligence Hub's Online Job Advertisement (OJA) release "2021q4" database.

Table A B.4. The demand for German skills among other occupations

Percentage of online vacancies explicitly or implicitly requiring at least some knowledge of German among clerical support workers, service and sales workers, skilled agricultural, forestry and fishery workers, craft and related trades workers, plant and machine operators and assemblers, and elementary occupations, by country

	Percentage of online job vacancies requiring German skills						
	Clerical	Service	Agriculture	Craft	Plant	Elementary	**National average**
Belgium	5.911	5.651	4.823	3.480	5.889	2.738	7.403
Bulgaria	6.894	1.873	0.746	2.603	8.995	3.483	5.671
Croatia	0.258	3.983	0.264	0.058	0.090	0.106	15.175
Cyprus	0.493	0.938	15.789	2.130	1.131	1.671	0.884
Czech Republic	5.570	1.650	0.000	1.337	6.851	1.227	4.222
Denmark	0.153	0.024	0.043	0.008	0.073	0.213	0.305
Estonia	0.999	0.204	0.606	0.528	0.295	0.279	0.600
EU	2.926	2.310	3.700	1.329	2.066	1.376	3.305
Finland	0.132	0.084	0.000	0.448	0.414	0.534	0.210
France	1.789	1.612	0.439	0.162	0.398	0.064	1.238
Greece	1.611	2.081	2.874	3.797	3.692	2.758	2.149
Hungary	7.620	6.255	3.835	1.195	2.699	1.369	6.526
Ireland	2.359	1.091	0.534	1.767	0.041	0.215	1.387
Italy	3.046	1.020	5.346	0.126	0.316	0.240	1.217
Latvia	1.085	1.600	0.254	0.222	0.160	0.435	0.970
Lithuania	0.560	0.753	0.543	0.086	3.526	0.260	1.002
Luxembourg	13.403	16.362	44.231	7.695	8.473	13.473	17.689
Malta	0.198	0.921	0.000	0.353	0.438	0.602	0.321
Netherlands	1.413	1.526	2.517	0.957	0.884	1.007	1.700
OECD	3.171	2.417	3.483	1.337	1.872	1.350	2.854
Poland	5.282	3.430	0.830	2.893	3.104	0.013	4.306
Portugal	10.967	4.685	2.696	1.626	0.799	1.124	4.223
Romania	0.189	0.383	3.514	0.668	2.648	0.827	2.078
Slovak Republic	0.719	0.221	0.801	0.486	0.225	0.549	1.084
Slovenia	0.409	0.251	1.600	0.433	0.330	0.716	0.728
Spain	1.412	0.679	0.151	0.146	0.126	0.467	1.033
Sweden	0.686	0.462	0.065	0.016	0.055	0.029	0.516
United Kingdom	1.458	1.109	0.961	0.678	0.963	0.645	1.429

Note: Countries are sorted alphabetically. Percentage of vacancies either specifying German as a required skill in the vacancy text or vacancies that were written in German. Data from Austria and Germany were excluded. "National average" refers to the average in a specific country across all occupational groups.
Source: Web Intelligence Hub's Online Job Advertisement (OJA) release "2021q4" database.

Table A B.5. The demand for Spanish skills among managers, professionals, technicians and associate professionals

Percentage of online vacancies explicitly or implicitly requiring at least some knowledge of Spanish among managers, professionals and technicians and associate professionals in 2021, by country

	Percentage of online job vacancies requiring Spanish skills			
	Managers	Professionals	Technicians	**National average**
Austria	4.885	0.031	0.003	0.015
Belgium	1.943	0.012	0.016	0.010
Bulgaria	5.472	0.044	0.020	0.025
Croatia	0.000	0.056	0.065	0.150
Cyprus	0.000	0.001	0.000	0.001
Czech Republic	0.839	0.017	0.013	0.008
Denmark	0.000	0.000	0.000	0.000
Estonia	0.010	0.000	0.000	0.000
EU	2.687	0.030	0.025	0.027
Finland	0.008	0.000	0.000	0.000
France	2.178	0.016	0.016	0.012
Germany	6.802	0.030	0.017	0.021
Greece	0.082	0.002	0.003	0.005
Hungary	1.417	0.030	0.010	0.015
Ireland	2.145	0.019	0.018	0.018
Italy	1.667	0.010	0.004	0.006
Latvia	0.000	0.000	0.000	0.000
Lithuania	0.064	0.002	0.002	0.002
Luxembourg	4.628	0.121	0.095	0.078
Malta	0.081	0.000	0.001	0.001
Netherlands	2.052	0.010	0.009	0.008
OECD	2.836	0.030	0.025	0.024
Poland	3.015	0.039	0.024	0.020
Portugal	28.819	0.298	0.306	0.289
Romania	3.015	0.035	0.034	0.022
Slovak Republic	0.000	0.015	0.000	0.003
Slovenia	0.000	0.000	0.000	0.000
Sweden	0.736	0.004	0.000	0.002
United Kingdom	1.097	0.010	0.006	0.008
Austria	4.885	0.031	0.003	0.015
Belgium	1.943	0.012	0.016	0.010

Note: Countries are sorted alphabetically. Percentage of vacancies either specifying Spanish as a required skill in the vacancy text or vacancies that were written in Spanish. Data from Spain were excluded. "National average" refers to the average in a specific country across all occupational groups.
Source: Web Intelligence Hub's Online Job Advertisement (OJA) release "2021q4" database.

Table A B.6. The demand for Spanish skills among other occupations

Percentage of online vacancies explicitly or implicitly requiring at least some knowledge of Spanish among clerical support workers, service and sales workers, skilled agricultural, forestry and fishery workers, craft and related trades workers, plant and machine operators and assemblers, and elementary occupations, by country

	Percentage of online job vacancies requiring Spanish skills						
	Clerical	Service	Agriculture	Craft	Plant	Elementary	**National average**
Austria	1.223	0.009	0.000	0.013	1.130	0.005	1.499
Belgium	0.930	1.155	0.000	0.011	0.812	0.015	1.047
Bulgaria	4.006	0.729	0.015	0.104	0.095	0.037	2.460
Croatia	15.983	47.419	0.264	15.617	15.068	5.088	15.012
Cyprus	0.000	0.000	0.000	0.290	0.323	0.371	0.064
Czech Republic	0.003	0.004	0.000	0.005	1.290	0.001	0.834
Denmark	0.015	0.003	0.000	0.006	0.000	0.005	0.005
Estonia	0.000	0.013	0.000	0.020	0.015	0.000	0.020
EU	2.892	3.480	0.492	1.841	2.341	0.416	2.736
Finland	0.029	0.031	0.000	0.019	0.000	0.010	0.015
France	1.866	1.513	0.094	0.287	0.787	0.068	1.210
Germany	1.771	1.168	0.012	0.191	1.383	0.004	2.095
Greece	2.768	0.157	0.575	0.931	0.752	0.205	0.512
Hungary	1.245	0.844	0.197	0.125	0.122	0.079	1.466
Ireland	3.291	1.342	0.000	0.061	1.018	0.045	1.789
Italy	0.963	0.353	4.403	0.103	0.262	0.036	0.578
Latvia	0.013	0.000	0.000	0.000	0.000	0.000	0.001
Lithuania	0.268	0.388	0.000	0.275	0.398	0.371	0.230
Luxembourg	0.000	0.000	0.000	0.000	0.000	0.000	7.811
Malta	0.000	0.132	0.000	0.000	0.146	0.000	0.057
Netherlands	1.006	0.630	0.000	0.020	0.137	0.024	0.754
OECD	2.533	1.897	0.384	1.320	2.016	0.197	2.369
Poland	1.598	0.445	0.000	0.002	0.419	0.007	2.024
Portugal	37.143	33.067	3.028	26.870	35.552	3.426	28.896
Romania	0.615	1.051	4.054	2.863	1.109	0.980	2.204
Slovak Republic	0.009	0.012	0.134	0.029	0.000	0.020	0.330
Slovenia	0.030	0.000	0.000	0.000	0.000	0.000	0.004
Sweden	0.410	0.014	0.011	0.014	0.034	0.012	0.223
United Kingdom	1.138	0.583	0.000	0.059	0.247	0.011	0.762

Note: Countries are sorted alphabetically. Percentage of vacancies either specifying Spanish as a required skill in the vacancy text or vacancies that were written in Spanish. Data from Spain were excluded. "National average" refers to the average in a specific country across all occupational groups.
Source: Web Intelligence Hub's Online Job Advertisement (OJA) release "2021q4" database.

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