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Thinking ahead for Europe

The Importance of Foreign Language Skills in the Labour Markets of Central and Eastern Europe

An assessment based on data from online job portals

Miroslav Beblavý, Brian Fabo and Karolien Lenaerts

No. 129 / January 2016

Abstract

In a globalised world, knowledge of foreign languages is an important skill. Especially in Europe, with its 24 official languages and its countless regional and minority languages, foreign language skills are a key asset in the labour market. Earlier research shows that over half of the EU27 population is able to speak at least one foreign language, but there is substantial national variation. This study is devoted to a group of countries known as the Visegrad Four, which comprises the Czech Republic, Hungary, Poland and Slovakia. Although the supply of foreign language skills in these countries appears to be well-documented, less is known about the demand side. In this study, we therefore examine the demand for foreign language skills on the Visegrad labour markets, using information extracted from online job portals. We find that English is the most requested foreign language in the region, and the demand for English language skills appears to go up as occupations become increasingly complex. Despite the cultural, historical and economic ties with their German-speaking neighbours, German is the second-most-in-demand foreign language in the region. Interestingly, in this case there is no clear link with the complexity of an occupation. Other languages, such as French, Spanish and Russian, are hardly requested. These findings have important policy implications with regards to the education and training offered in schools, universities and job centres.

InGRID
Integrating expertise in inclusive growth

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Executive summary

With a sample of **about 74,000 job advertisements** published on leading online job boards in the four countries that constitute the **Visegrad group**, i.e. the Czech Republic, Hungary, Poland and Slovakia, we examine the **demand for foreign language skills**. More specifically, we count **how many job advertisements** request foreign language skills and then consider **which languages** are demanded the most (focusing on English, German and several other languages). As a second step, we focus on 59 occupations (of which two are low-skilled, 20 medium-skilled and 35 high-skilled) that could be identified in each of the countries (using about 66,000 vacancies in this second part of the analysis). In our analysis, we therefore exploit both the **cross-country** and the **cross-occupation** dimensions of our dataset. The Visegrad group is a **particularly interesting case to study** because these countries are relatively open to international trade and foreign investors. Moreover, the region has important historical, cultural and economic ties with the neighbouring countries Germany and Austria and shared a border with the former Soviet Union. In addition, in none of the countries is the main national language among the most widely spoken languages in Europe. This implies that it is not so straightforward to predict which language skills will be demanded the most in the Visegrad region: English, German, Russian or even another language? We compare our findings for the demand side of the labour market in the region with information on the **supply of foreign language skills** (from the Eurobarometer survey conducted in 2012). Our work is related to earlier studies that perform job vacancy analysis using a set of vacancies published offline or online. We contribute to this literature as well as to literature on the role of languages in the economy. Our results could be of interest to job seekers, education institutes, employment agencies and the government, because they provide more insight into the foreign language demand of employers in the region.

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Our main conclusions for the Visegrad region:

1. Employers in the Czech Republic, Hungary, Poland and Slovakia do require knowledge of foreign languages. **Foreign languages are demanded in one-third to three-fourths of the job advertisements** published in the region.
2. In the Visegrad region, **English** is the most demanded foreign language skill: it is mentioned in **52%** of the vacancies (across all occupations). However, only between 25% and 33% of the Visegrad population speaks the language well enough to have a conversation in English. There appears to be a **positive relationship between the complexity of an occupation** on the one hand and the **demand for English language skills** on the other hand.
3. **German** is the second most requested language in the region, despite the region's historical, cultural and economic ties with Germany and Austria. German language skills appear in **12%** of the advertisements (again when all occupations are included). Between 15% and 22% of the Visegrad population has sufficient German language skills to have a conversation in the language. There is **no clear relationship** between the demand for German language skills and the complexity of an occupation.
4. Other languages, such as French, Italian, Spanish and Russian, are only present in **less than 3% of the vacancies**. This is an interesting finding, as some of these languages are among the most commonly spoken native languages in Europe.

Account Manager Doctor Financial Advisor IT Analyst HR Manager Architect Industrial Engineer Telesales/Call Center Office Manager Teacher Financial Manager Production Director Tax Advisor Cook Team Leader Receptionist Buyer GERMAN Forklift Operator Accountant Electrical Mechanic Foreman Electrician Tester Business Analyst Welder Key Account Manager Assistant Project Manager Computer Specialist Mechanic Sales Team Leader Lawyer Civil Engineer Locksmith Regional Sales Representative Sales Director Customer Support Worker IT Administrator Marketing Professional Programmer Merchandiser Technician Marketing Manager Nurse Warehouse Worker Transport Clerk Consultant Driver Financial Controller Operations Manager Laborer Quality Control Financial Analyst Sales Representative Cashier Packer/Auxiliary Laborer Office Worker Product Manager Retail Assistant

Czech Republic

Highest demand for **English**
1. Tester (*high-skilled)*
2. HR Manager (*high-skilled)*
3. Receptionist (*medium-skilled)*

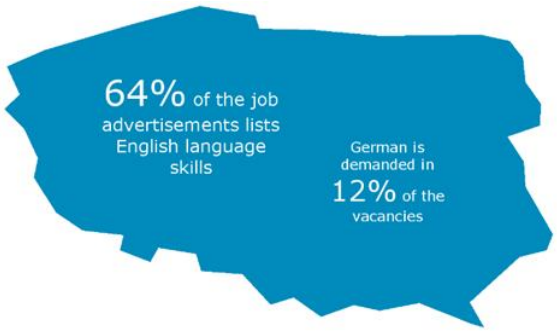
Highest demand for **German**
1. Industrial Engineer *(high-skilled)*
2. Production Director (*high-skilled*)
3. Quality Control (*high-skilled*)

Highest demand for **English**
1. Business Analyst (*high-skilled)*
2. Marketing Manager (*high-skilled)*
3. Product Manager (*high-skilled)*

Highest demand for **German**
1. Industrial Engineer *(high-skilled)*
2. Transport Clerk (*medium-skilled*)
3. Quality Control/Buyer/Tester (*high-skilled*)

Hungary

Poland



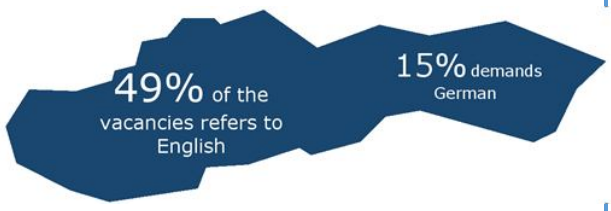
Highest demand for **English**
1. Tax Advisor *(high-skilled)*
2. Industrial Engineer *(high-skilled)*
3. Business Analyst *(high-skilled)*

Highest demand for **German**
1. Welder (*low-skilled*)
2. Quality Control (*high-skilled*)
3. Office Manager (*high-skilled*)

Highest demand for **English**
1. Tax Advisor *(high-skilled)*
2. Financial Controller (*high-skilled*)
3. Tester (*high-skilled*)

Highest demand for **German**
1. Receptionist (*medium-skilled)*
2. Nurse (*high-skilled*)
3. Office Manager (*high-skilled*)

Slovakia



1. Introduction

Among the qualifications and skills that job seekers generally incorporate into their curriculum vitae (CV) is their proficiency in foreign languages. In many CV templates that one can find online, e.g. the EUROPASS CV, foreign language skills are one of the main components, together with educational attainment and training, previous work experience and other commonly mentioned skills, e.g. computer skills. Especially in the European Union, with its 24 official languages and its numerous regional and minority languages, knowledge of foreign languages can play a main role in everyday life. Moreover, it is also essential for international mobility and integration, and it reflects cultural competences. As such, foreign languages serve as a tool to bridge intercultural gaps and contribute to a mutual understanding. European policy-makers have therefore implemented a range of policies and programmes to encourage foreign language acquisition among the European population. According to a Eurobarometer survey conducted in 2012, 54% of Europeans speak at least one other (foreign) language, in addition to their mother tongue, while 25% can speak at least two foreign languages and 10% at least three (Eurostat, 2012).

In our work, we focus on the **importance of foreign languages on the labour market**. We build on earlier work such as Esser (2006), who states that language is an essential part of human capital and points to its impact on labour supply and labour market allocation. The emphasis that job applicants put on their foreign language skills in their CVs clearly illustrates the importance that they attach to these skills. But how important are foreign language skills on the European labour market? This question is at the heart of a recent report entitled "Language for Jobs", prepared by the thematic working group "Languages for Jobs" as part of the European Strategic Framework for Education and Training (ET2020 report henceforth, in 2011). This report has the objective of formulating policy recommendations in order to ensure a better match between the demand and the supply of language skills on Europe's labour markets. As such, it fits well within the EU2020 strategy, which emphasises the skill needs of the future. From the ET2020 report, it is clear that the demand for foreign language and communication skills has grown considerably in recent years. This development is driven by the multilingual and multicultural environment in which firms of all sizes increasingly operate, the global competition that they face and their aim to broaden their market access. The report also notes that the demand for languages varies according to the role and position a worker holds within a company, and that there is a link with the job's level of complexity.

In this globalised world, characterised by technological progress and incredible advancements in the information and communication industry, **English** plays a leading role. The language has developed into the main global business language and is spoken widely across the globe. In Europe, English is the most widely and the most fluently spoken foreign language, and it is the mother tongue of about 13% of the population (Eurostat, 2012). Despite the language's role as a global business language, other languages are gaining ground. The ET2020 report predicts that English language skills will remain important in the future but that these skills increasingly will be regarded as 'basic' skills. In contrast, knowledge of languages spoken by trade partners or neighbouring countries will be what determines firms' competitive edge. Languages such as **Arabic, French, German, Spanish, Chinese and Russian** have gained importance. In this regard, the foreign language skills that immigrants bring are very relevant too. Unfortunately, education institutes and governments seem to be lagging behind with respect to these developments.

Nevertheless, the population's foreign language skills in many European countries remain relatively poor. According to the 2012 Eurobarometer, 46% of the European population is not able to speak any foreign language well enough to be able to have a conversation. This number ranges from 2% of the population in Luxembourg to 65% of the population in Hungary. The countries with the largest shares of the population that is unable to speak any foreign languages are Hungary, Italy, Portugal, the United Kingdom, Ireland, Spain, Bulgaria, Romania, the Czech Republic and Poland. In each of these ten countries, at least half of the population cannot speak any foreign languages. Still, this does not preclude that foreign language skills are demanded on the labour market. For the case of Italy, for example, Beblavý et al. (2015c) considered a sample of 41,000 job advertisements for 54 occupations from one of the leading job portals and found that 34% of these advertisements requires English language skills. Furthermore, 5% of these vacancies demands German, 2% requires French and 1% lists Spanish language skills. Interestingly, there appears to be a positive relationship between the demand for English and the complexity of an occupation (measured by its International Standard Classification of Occupations, or ISCO, classification code). Italy is an interesting case, because Italian is the second most widely used mother tongue in the EU (Eurostat, 2012). Still, only 2% of the Europeans who do not have Italian as their mother tongue indicate they speak Italian well enough to understand the television news or radio. This could imply that learning foreign languages is important for Italians who work abroad or for a foreign employer or interact with foreign clients and colleagues on a regular basis. In Italy, the three most widespread foreign languages are English (34% of the population can have a conversation in this language), French (16%) and Spanish (11%).

Out of the ten countries in which at least 50% of the population is unable to hold a conversation in a foreign language, five are located in Central and Eastern Europe (all have joined the European Union in 2004 or 2007). In this research note, we concentrate on the countries in this region that constitute the **Visegrad Four** (but our work can easily be extended to other countries as well) and evaluate the demand for foreign language skills. In this way, we aim to contribute to the literature. Even though there clearly is an interest in this topic, as evidenced by the report we refer to above, the literature appears to be relatively limited. We have selected the Visegrad group because we are interested in the role of language skills on the labour

markets in countries that are open to international trade and foreign investors. Furthermore, in the Visegrad Four, the language skills of the population may not be as well-developed as in some other European countries (with the exception of Slovakia). For three of the countries, the main national language is not among the five most widely spoken languages in Europe (Polish shares the fifth position with Spanish). Moreover, there are strong historical and economic ties between the Visegrad countries on the one hand and Germany and Austria on the other hand. Does this imply that **German** is the most frequently demanded foreign language in the region or is **English** more popular (as it is the most widely spoken foreign language; Eurostat, 2012)? In addition, we examine the role of other European languages, such as **French, Italian, Spanish and Russian**.

We present our results, based on an analysis of the foreign language demands of employers using data from online job portals, as a research note. We study this topic from different angles, focusing on **both the cross-country and the cross-occupational dimension**. In our note, we pilot an innovative methodology: our dataset comprises about 74,000 job advertisements published on online job portals that cover a substantial segment of the labour market in each of the countries examined. From the vacancies in this sample, we distil employers' language requirements for 59 occupations (low-, medium- and high-skilled). We only consider occupations that are present in all countries and for which at least 30 vacancies were found. By using a sub-set of occupations and their corresponding vacancies (reducing the sample by about 10%), we are able to gather a sufficient number of job advertisements to examine occupations with different responsibilities and tasks and of various levels of complexity (for which fairly different skills may be needed). Our objective is to determine how important foreign languages are, which languages are demanded the most and how this differs across countries and occupations. Our work further contributes to a rapidly advancing literature in which web-based data, such as vacancies, are used for labour market analysis (Askitas & Zimmermann, 2015).

With our sample of approximately 74,000 job advertisements (covering all occupations for which advertisements are published on the individual job portals), we show that employers in the Czech Republic, Hungary, Poland and Slovakia **do require foreign language skills. Between one-third and three-fourths of vacancies** across the countries contain language requirements. Especially in Poland, many employers list foreign language demands in their job advertisements. Despite the strong economic, cultural and historical ties of the Visegrad Four with Austria and Germany, **English is the most demanded foreign language** on the labour markets (the share of advertisements listing English varies from 20% to 60%). German is the second most demanded language (it appears in about 10% of the vacancies). While we detect a positive relation between English language demands and the complexity of an occupation (when we restrict our analysis to a set of 59 occupations and their corresponding vacancies that can be identified in each of the countries), such a relation is not found for the German language. We do see quite some variation across the occupations considered, a result that we elaborate on in the following parts of this note. We also explore the relation between these foreign language demands and wages. By introducing our results as a research note, we hope to stimulate the debate on the topic. Furthermore, it is our aim to expand our research on the subject, as our work currently is still in progress. In comparison with an academic article

this research note has a less rigorous literature section, but we do briefly point to the literature in which our research is embedded.

In the remainder of this research note, we first explain why the Visegrad region is particularly interesting for an analysis of foreign language demands on the labour market. We then continue with a brief overview of the literature on the importance of language skills on the labour market. As a next step, we introduce our methodology and sample and elaborate on the data collection and cleaning process. In our dataset, we start from 74,000 vacancies. We then concentrate on 59 occupations (low-, medium- and high-skilled), which could be identified in each of the countries and for which we were able to gather a sufficient number of vacancies (specifically, occupations that were not present in each of the countries or for which only a very small number of vacancies were available, were not retained). The remainder of the research note then comprises small segments that each cover a finding or result that we want to highlight. In our analysis, we first outline the overall demand for language skills in the region and then turn to the individual occupations. In each case, we first discuss English and then German. We discover that English is the most frequently requested foreign language. German takes up the second position. While there is a clear positive relationship between the demand for English language skills and the complexity of an occupation (measured via the ISCO code), we do not reach a similar conclusion for German. However, German language skills do appear to be very important for specific occupations, in ISCO classes 3-4 and 7-8 (technicians, clerks, craft and related trade workers, plant and machine operators and assemblers). This result could point to the fact that many of these workers are employed abroad or hired by foreign employers. We then considered the correlations between the percentage of vacancies that require English and German with the hourly wages for the Czech Republic and Slovakia (due to data unavailability, the other two Visegrad countries could not be considered in this analysis, unfortunately). In line with our earlier results, we find a clear link for English but not for German (there we even see a negative relationship). This research note is concluded with a brief summary of our main findings.

2. Why do we examine the Visegrad case?

After the fall of the Berlin Wall in 1989, the former communist countries of Central and Eastern Europe quickly integrated into the European and the global economy. In this research note, we focus on the Visegrad Four (V4), which is composed of **the Czech Republic, Hungary, Poland and Slovakia**, and characterised by a close collaboration of its members towards European integration (and in other areas as well). All four countries joined the European Union in 2004 and Slovakia adopted the euro as its currency in 2009. **Figure 1** presents a map of Europe: Visegrad countries are indicated in dark green (order from north to south: Poland, the Czech Republic, Hungary and Slovakia).

Figure 1. Map of Europe

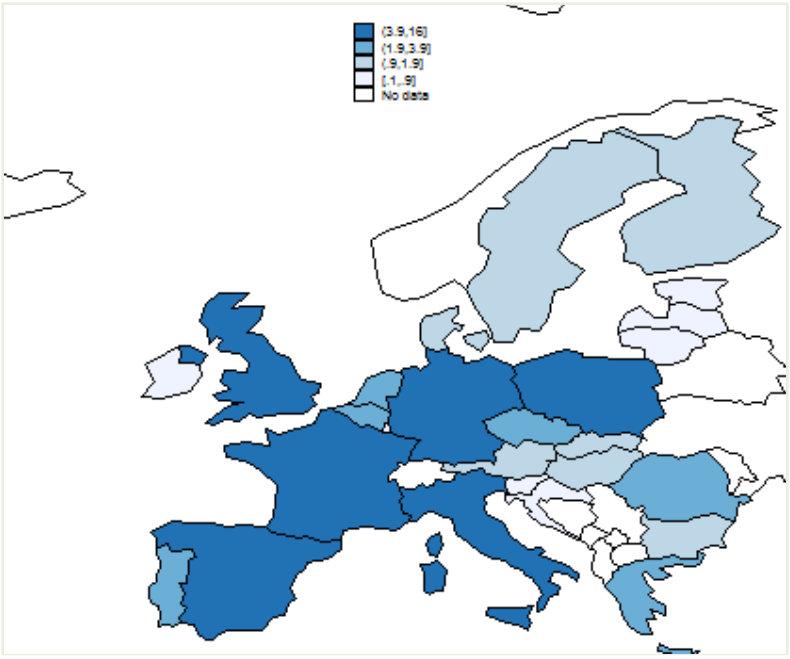
Note: The four Visegrad countries are indicated in green.

When these countries entered the European Union in 2004, together with four other countries, there was a fear that this would lead to job losses and outsourcing (which would not be limited to low-skilled jobs and also comprise rapidly advancing industries such as IT). Especially in Germany and Austria, this was an important issue given their geographical proximity and their historical ties with these countries (Marin, 2010). Nevertheless, Marin (2010) calculates that these fears were unfounded, at least to some degree. The job loss that resulted from the enlargement was less than 0.5% of total employment in Germany and 1.5% of total employment in Austria. In fact, low-cost jobs performed in companies' affiliates in Eastern Europe even contributed to the competitiveness of German and Austrian firms.

During the last decade, the economies of the four Visegrad countries have grown considerably, attracting substantial amounts of foreign direct investment. Below, we present a series of tables and graphs for the Visegrad region, in order to compare the four countries with each other and the EU-28 and to understand the similarities and the differences between them.

In **Figure 2**, we compare the Visegrad countries in terms of the size of their population in 2015. With its 38.01 million citizens, which is equal to 7.5% of the total EU-28 population, Poland has the largest population of the V4. The Czech Republic and Hungry both count about 10 million inhabitants (2% of the EU-28 total). Slovakia has the smallest population of the Visegrad group: it has 5.42 million inhabitants (or 1.1% of the EU-28 total population). How great is unemployment in each of the countries? In 2014, the average annual unemployment rate was 6.1% in the Czech Republic, 7.7% in Hungary, 9% in Poland and 13.2% in Slovakia (Eurostat data).

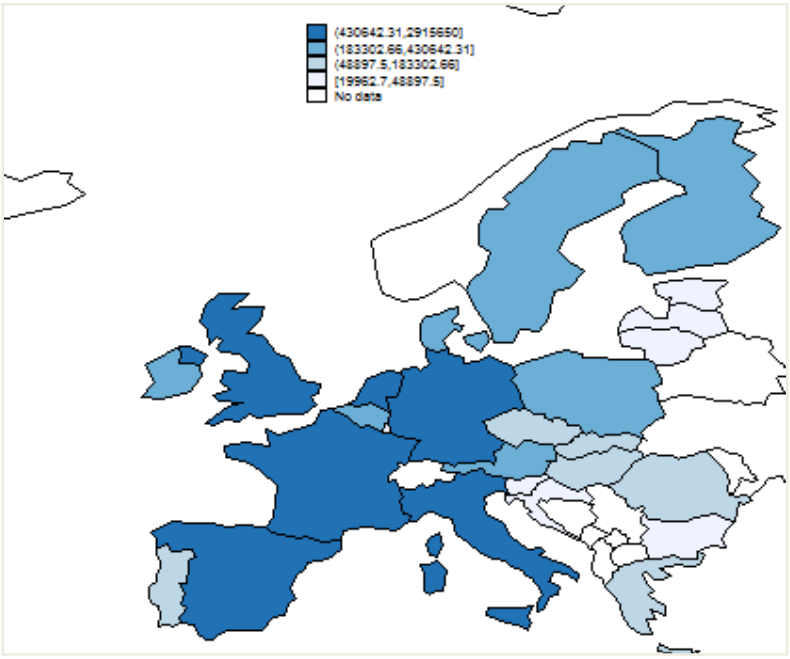
Figure 2. Population as a percentage of total EU28 population in 2015



Source: Eurostat.

In addition to the largest population, Poland also reports the largest GDP of the Visegrad Four (**Figure 3**). According to the most recent data, Poland's GDP amounts to €104,731 million (third quarter of 2015, Eurostat). The second largest GDP is recorded for the Czech Republic: €42,098 million. For Hungary and Slovakia, GDP is equal to about €27,840 million and €20,618 million respectively. Whereas the Czech Republic, Hungary and Slovakia have GDP levels similar to other countries in the south and east of the Union, Poland's GDP appears to be linked to the countries in the west. Note that in **Figure 3**, we show GDP data for year 2014.

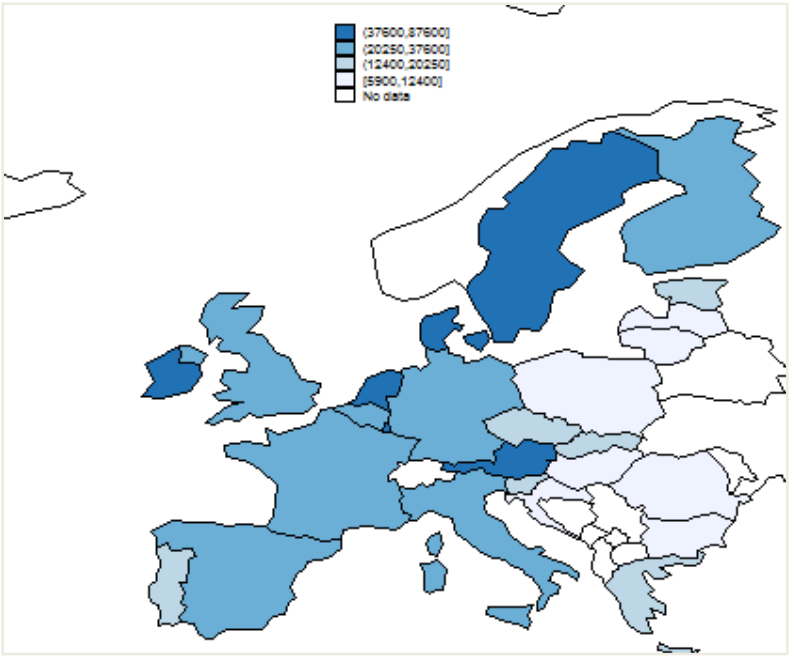
Figure 3. GDP, in market prices, current, millions of euro, 2014



Source: Eurostat.

A different image emerges when we focus on GDP per capita in **Figure 4**. For 2014, we detect the highest GDP per capita in the Czech Republic, where it is equal to €14,700. In the second position we find Slovakia, with a GDP per capita of €13,900. For Poland and Hungary, the numbers are €10,700 and €10,600 respectively.

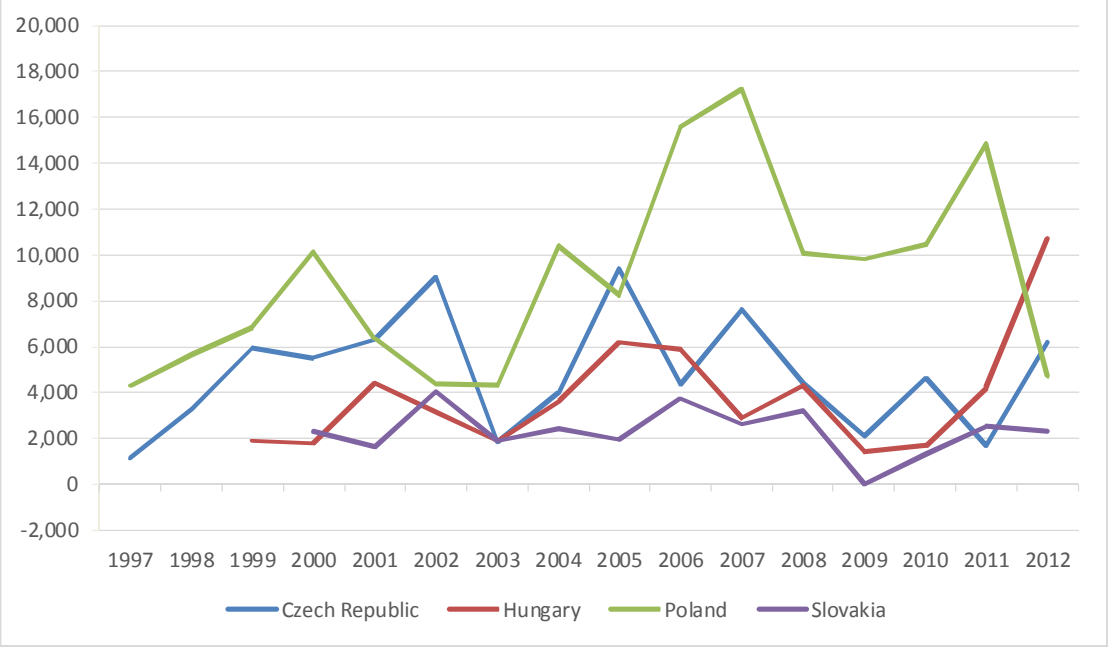
Figure 4. GDP per capita, current prices, euro, 2014



Source: Eurostat.

As a next step, we examine **foreign direct investment** and **trade** in the region. As indicated above, since the second half of the 1990s, foreign direct investment inflows into the region have been substantial. **Figure 5** shows the inflows of foreign direct investment between 1997 and 2012 for each of the countries (expressed in millions of ECU/EUR). Especially Poland and the Czech Republic appeared to attract a lot of investments. After 2010, Hungary also managed to attract substantial investments. According to FDI inflow data from the OECD for 2012, the three main investors in the Czech Republic were the Netherlands, Germany and Austria. For Hungary, the main investors were Luxembourg, Italy and the United Kingdom. Poland's largest FDI inflows stemmed from Germany, France and the United Kingdom, while Slovakia's main investors were the Czech Republic, Germany and Italy. Interestingly, Radlo & Sass (2012) show that the Visegrad countries are also developing into source countries for foreign investment. In fact, outward foreign direct investment and emerging multinationals from Central and Eastern Europe appear to emanate primarily from the Visegrad region (which for that reason is regarded as 'leading' in the area). Radlo & Sass (2012) also conclude that especially intra-Visegrad investments, and in particular investments made by pairs of countries, are important.

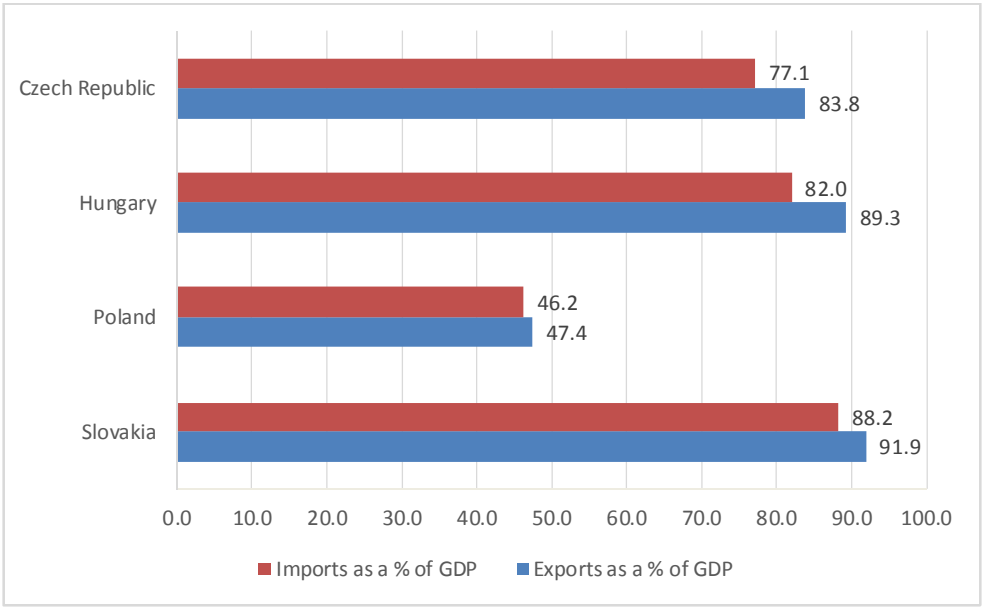
Figure 5. FDI inflows in millions of ECU/EUR



Note: in 2009, inflows were negative in Slovakia (value of -4 million).
Source: Eurostat.

In **Figure 6**, imports and exports of goods and services, expressed as a percentage of GDP, are shown for 2014. Trade as a percentage of GDP is often used as a measure of a country's openness. From the figure it is clear that Poland has the lowest share, as both the share of imports and exports are substantially lower than those in the other three Visegrad countries. The highest shares are detected for Slovakia. We can infer that the countries in the Visegrad group are very open to international trade.

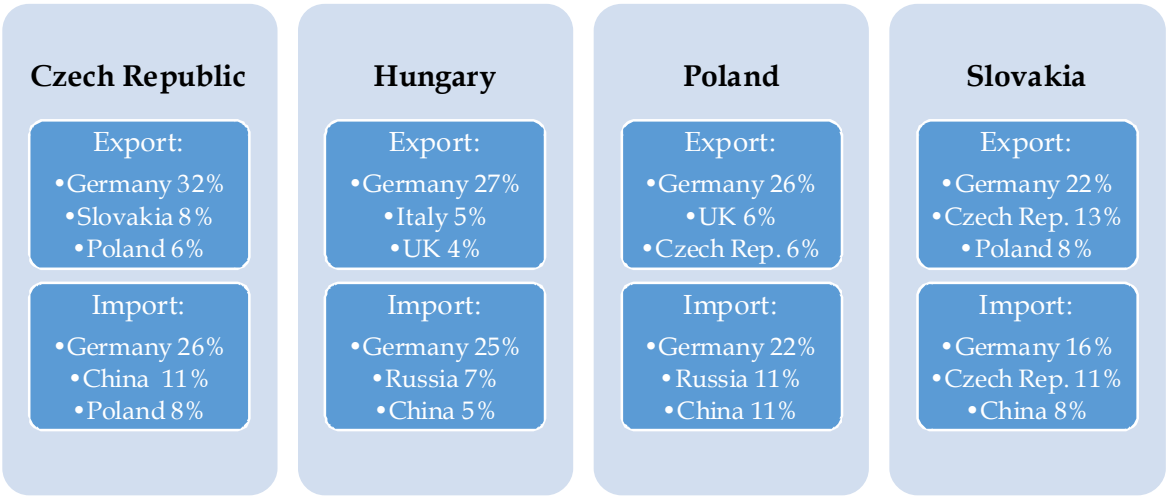
Figure 6. Imports and exports of goods and services as a percentage of GDP, 2014



Source: Eurostat.

The main trade partners for each of the countries are depicted in **Figure 7**. Interestingly, for all four countries, **Germany** is the main trading partner, both in terms of imports and exports.

Figure 7. Main trade partners of the V4 (import share and export share)



Source: World Bank, data refer to 2014.

The **developments described above make the Visegrad Four a particularly interesting region to study**. To analyse the role of foreign language skills on the labour market, our idea was to start from a group of countries that are open to international trade and foreign investment. Given the prominence of English in international trade and business, one could expect that in the Visegrad Four, which are fairly open, **English** language skills are highly demanded on the labour market. This is a first hypothesis that we explore. English has indeed been recognised as an important transversal skill (Sanchez et al., 2011). Using the Visegrad

group as a case study has some other advantages as well. In none of the four countries is the main national language among the five most widely spoken European languages. None of the countries is bilingual. They additionally have common roots but took different development paths, which calls for a comparison of results. Furthermore, the Czech Republic, Hungry, Poland and Slovakia have strong economic, historical and cultural ties with Germany and Austria, and shared a border with the former Soviet Union (in many of the former member states, Russian is still a key language). This could imply that English is not the main foreign language demanded on the labour market, but instead could be surpassed by **German**, **Russian** or maybe even one of the other countries' official languages (given that they have an alliance to support their further integration and collaboration). In addition, it is interesting to discover to what extent the other main European languages, such as **French**, **Italian** and **Spanish**, are deemed important on the Visegrad's labour markets. Another interesting point is made by Marin (2010), who reports that after the enlargement, skill intensive activities were outsourced by German and Austrian firms to the east (where skill endowments were higher). This resulted in reverse 'maquiladoras'[1] in Germany and Austria: skill-intensive activities were outsourced while labour-intensive activities were still done by firms at home. So how important are skills, and language skills in particular, on the labour market?

Before we begin with our analytical work, we want to gain an understanding of the **knowledge of foreign languages** that the citizens in the Visegrad region have. This is important with regards to the potential policy implications of our research: if such language skills are very important on the labour market (highly demanded by employers) but, at the same time, only acquired by a small fraction of the population, this would be a call for action from the governments. In other words, in order to understand the demand, we also need information on the supply of these skills. In 2012, a special report entitled "Europeans and their languages" was published. It outlines the language skills of citizens in the EU-27 and is an excellent data source to answer our question. The report presents the share of people able to have a conversation in English or German in each of the EU-27 member states. These numbers are reported in **Table 1** below.

Table 1. Share of people able to have a conversation in English or German in the EU-27 and the V4

	English	German
EU-27	38%	11%
Czech Republic	27%	15%
Hungary	20%	18%
Poland	33%	19%
Slovakia	26%	22%

Source: Eurostat, 2012: Special Eurobarometer Report 386.

[1] In the field of economics, maquiladoras are a widely studied phenomenon (Bergin et al., 2009). When US firms started to offshore parts of their production, this resulted in US companies producing components and parts, which were exported to Mexico (duty- and tariff-free), where they were assembled in "maquiladoras" (assembly, processing or manufacturing plants), and then re-imported as finished goods in the US. These Mexican maquiladoras therefore specialised in assembly of products.

In the EU-27, 38% of the population indicates an ability to have a conversation in English. For German, this figure is 11%. When we look at the Visegrad Four, we detect lower percentages for English (ranging from only 20% in Hungary to 33% in Poland) and higher percentages for German (which range from 15% in the Czech Republic to 22% in Slovakia). One explanation for the lack of English skills among the population of the V4 countries could be the importance of the neighbouring countries in which German is the national language. These historical ties cause German to remain important in the region, as reflected by the rates of German proficiency (which are above the EU average). Across the EU-27, 12% of the respondents to the Eurobarometer survey indicate that they are able to have a conversation in French, 7% in Spanish and 5% in Russian (Eurostat, 2012). In Hungary, 3% of the respondents are able to hold a conversation in French. In Poland, 18% of the population is able to speak Russian. Spanish, Russian and French are not among the three most widely spoken foreign languages in either the Czech Republic (where Slovak completes the top three, 16%) and Slovakia (where Czech completes the top three, 47%). In summary, the most widely spoken foreign languages are English, Slovak and German in the Czech Republic (27%, 16% and 15% of the population can hold a conversation in this language, respectively), English, German and French in Hungary (20%, 18% and 3 %, respectively), English, German and Russian in Poland (33%, 19% and 18%, respectively) and English, German and Czech in Slovakia (47%, 26% and 22%, respectively).

3. Related literature

Our analysis of employers' demand for foreign languages in the Visegrad region is embedded in the literature on the **role of language in the economy**, which has been surveyed fairly recently by Zhang & Grenier (2013).[2] In the last few decades, communication and the knowledge and use of foreign languages have become increasingly important in many economic activities (as a result of the rapid globalisation). These developments have incited a number of contributions on this topic. Zhang & Grenier (2013) argue that traditional research on the relationship between economics and languages can be divided into three strands: **language and economic status**, **dynamic development of languages** (from an economic perspective) and **language policy and planning** (also from an economic perspective). Since the 1990s, other work on economics and languages has emerged, which applies **game theory to model linguistic issues** (Zhang & Grenier, 2013). This approach appears to be more pragmatic. Note that studies on bilingual labour markets, such as Armstrong (2015), often also start from a game-theoretical set-up.

As economies worldwide become interconnected, countries are faced with international trade, foreign direct investment and migration. For all these phenomena, language undoubtedly plays a role. Kim et al. (2015) investigate the link between language and **foreign direct investment** (FDI) and find a significant, robust relationship between them. Oh et al. (2011)

[2] There also exists a strong link between our work and other strands of interesting literature that covers the importance of language, however a review of this literature is beyond the scope of this research note.

explore the transaction costs that exist between country pairs that do not speak the same language – with a focus on English, French, Spanish and Arabic – and compare the transaction costs related to **trade** and FDI for these four languages. Their results suggest that speaking a common language raises both trade and FDI, but appears to have a larger impact for the former than for the latter. They also detect a common hierarchy in transaction costs for both phenomena: transaction costs are the lowest for English, followed by French, Spanish and Arabic. The relationship between language and **migration** has also received a lot of attention. Yao & van Ours (2015) examine the importance of Dutch language skills for immigrants in the Netherlands. The authors find no impact of weak language skills on employment probability, hours of work or hourly wages for male immigrants. For female immigrants, however, a negative impact on hourly wages is reported. In another article, Budria & Swedberg (2015) assess how immigrants' Spanish language proficiency affects their earnings. They report that being proficient in Spanish raises immigrants' earnings by about 27 percentage points, but the education level of an immigrant also matters. Earnings returns reach 50% for high-educated workers, but generally appear to be insignificant for low-educated workers. Rooth & Ekberg (2006) relate language skills to occupational mobility in Sweden. While immigrants' first occupation had a lower status than the one they held in the home country, there was a clear improvement in occupational status over time. The results further suggest that upward mobility accelerates among those who have invested in a Swedish academic education or destination-specific language skills. Bleakley & Chin (2004) indicate that language is a social and economic barrier that separates immigrants from natives. Migrants with poor language skills often face discrimination and social isolation. In addition, a lack of language skills may reduce their productivity and result in an earnings gap. Other contributions have confirmed these results. Bleakley & Chin (2004) report that English language skills have a large positive impact on immigrants' educational attainment and wages. Chiswick & Miller (2010) investigate the demand for English in the United States. They find a stronger relationship between proficiency in English and intra-occupational earnings differences than between proficiency in English and inter-occupational differences.

Another set of papers considers **historical and cultural ties** to explain why certain language skills are (still) relevant on the labour market. As an example of this work, we list two papers that cover Russian language skills in countries in Central and Eastern Europe. Lindemann & Kogan (2013) discuss the issue of language proficiency in labour market entry among young workers in Estonia and Ukraine. In Ukraine, being able to speak Russian – in addition to the national language – appears to be much important than in Estonia. This difference can be attributed to disparities in the immigration history of the Russian minority population and the language prevalence in both countries. In another contribution, Duncan & Mavisakalyan (2015) consider the importance of Russian language skills on the labour market in Armenia, Azerbaijan and Georgia for the period 2008-10. In these three countries, the Russian language is still commonly used in everyday life. Duncan & Mavisakalyan (2015) confirm that speaking Russian is a valued skill on their labour markets: Russian proficiency raises the probability of employment by about 6 percentage points in the case of males and by about 9 percentage points in the case of females.

More relevant to our research note is the literature that examines the importance of language skills in **specific occupations.** Maxwell (2010), for example, analyses the role of English language skills in low-skilled jobs on the basis of survey data. A first intriguing result of his paper is that often for jobs labelled as "open to workers with limited knowledge of the English language" such skills are demanded anyhow. Secondly, he argues that workers with a limited knowledge of the English language have fewer employment opportunities and lower wages. For the case of Germany, Stöhr (2015) examines the wage premia of occupational language requirements. The starting point for his paper is the empirical evidence suggesting that workers earn substantial wage premia for their foreign language skills in Europe. English language skills at the expert level indeed are associated with wage premia in Germany, and this result holds for migrants in particular. In contrast, Stöhr (2015) finds no systematic return to occupational use of other foreign languages. Another example is the paper by Coombs & Cebula (2009), who study the rewards for language skills for registered nurses in the United States but find mixed results. In a related study, Beblavý et al. (2015b) examine the skill demand of US employers on the basis of a sample of advertisements extracted from the labour market information website Burning Glass. They report that language skills are demanded in 16% of the vacancies, while communication skills are requested in 23% of the advertisements. A final interesting article is Kureková et al. (2012). These authors consider the demand for a range of skills for 23 low- to medium-skilled occupations in Slovakia. In their work, the distinction is made between language (cognitive) and communication skills (non-cognitive). In 28% of the job advertisements, communication skills are mentioned (it is the fourth most demanded skill). Interestingly, knowledge of foreign languages is demanded in 38% of the vacancies (making it the second most demanded requirement). This skill therefore is particularly important, even for low- and medium-skilled jobs performed on the domestic market. These results, nevertheless, conceal major differences across the occupations: the share of vacancies that requires foreign language skills ranges from 2.2% (engine drivers) to 84.4% (au pair). Still, knowledge of foreign languages is among the three most requested skills or qualities for 20 out of the 23 occupations studied, i.e. 87%.

4. What can we learn about the demand for foreign languages from a dataset obtained from online job boards?

From the brief review of the literature in the previous section, it is clear that only a small number of studies address the foreign language skills demanded by employers. Moreover, at first sight, most of this work seems to concentrate on the US labour market. One potential explanation as to why there are only a few studies on this topic is that data on employers' demands are hard to come by. This issue, however, can be resolved relatively easily with a sample job advertisements from online job portals.

Online job boards are essential in the matching of candidates to open positions (Kureková et al., 2015a; 2015b). Many portals are no longer limited to job search and matching but have developed into fully-fledged employment communities. Most portals allow users to submit a CV and resume, offer career advice and include employer ratings. Carnevale et al. (2014) argue that the online job boards clearly are beneficial for all agents on the labour market, from job

seekers who can easily compare a larger set of vacancies and get a better understanding of what potential employers want, to employers who can draw attention to their advertisements while keeping the advertising costs low. Importantly, online job portals also provide valuable information to the education sector.

Several recent articles, including Carnevale et al. (2014), Kuhn (2014), Kuhn & Mansour (2014) and Kureková et al. (2015a), have recognised the incredible potential that job portals bring to the study of labour markets. The number of studies that use job advertisements published online therefore is likely to grow substantially in the future. Vacancies published on online boards are an interesting data source since they are publicly available, clearly structured and fairly detailed. They provide up-to-date information on the qualifications and skills employers demand in their search for candidates. In addition, vacancies contain information on the tasks and responsibilities that the position actually entails. Early work in this field generally made use of a sample of printed job advertisements to examine the labour market (Jackson et al., 2005; Jackson, 2007; Dörfler & van de Werfhorst, 2009). Then, data collection was often tedious and difficult. In contrast, obtaining a sample of vacancies from online portals is relatively easy and fast, and the data collection process is flexible and cheap. This allows researchers to gather larger and more diverse samples. Another advantage is that online job boards facilitate cross-country and cross-occupation analyses, given that one can easily extract data for multiple countries and occupations.

Nevertheless, Carnevale et al. (2014) and Kureková et al. (2015a) do point to some limitations in this research. A first limitation is that vacancy data are not representative to the population as a whole, for a variety of reasons, e.g. not all vacancies correspond to actual jobs, not all vacancies are published online and not for all new positions is a vacancy published). Nevertheless, this 'bias' is unlikely to affect certain populations more than others. Moreover, Carnevale et al. (2014) demonstrate that online job boards generally cover highly-skilled white-collar STEM positions and therefore especially target highly educated applicants. For these reasons, we are careful in our selection of the portals and the occupations that we focus on. In this research note, we present an analysis based on a set of job advertisements for the Visegrad Four. More details on the job portals, the methodology and the resulting dataset of vacancies are presented below.

5. On the basis of the information published on four job portals that counted about 74,000 advertisements across the Visegrad Four …

In order to empirically investigate how important knowledge of foreign languages is for job seekers in the Visegrad region, we first need to collect data. For each of the Visegrad countries, we extract data from a representative online job portal. In our study, "representative" means that the job boards were not chosen randomly but instead selected after a careful analysis of their labour market coverage (for example, we verify whether they cover all industries, all occupations, and so on). The job portals that we used are listed in **Table 2** below. One way to document the demand for foreign language skills at the micro-level is to gather a sample of job advertisements published online (through web crawling). As pointed out in the previous section, such data are difficult to obtain through other sources. In this research note, we **opt**

for another approach. We also rely on online job boards but do not crawl these portals for vacancies. Instead, we use the "tag system" of the job boards. Each of the four job portals uses a **system of tags** to organise individual job advertisements into clusters to facilitate the search process (when a job seeker enters a search term, this system ensures that multiple comparable vacancies are presented rather than just one). In our analysis, we focus on these tags and **consider the number of vacancies offered on the portal** as well as the **number of vacancies offered with a tag that refers to foreign language skills** (meaning that on these portals one can 'filter' jobs, or select only jobs that require "English" for instance). On most online job portals, the tags roughly correspond to occupations, which implies that the list of tags in fact is a list of occupations. Still, in many cases other tags are available as well. In our study, we **use the list of tags, both to identify the occupations as well as to detect the foreign language demands**. Note, however, that tags are not disjunctive groups: a single job advertisement could indeed be mapped into several occupations or can, for instance, demand knowledge of multiple foreign languages. Of the four online job boards, only the Slovak portal publishes an information table of all tags (which also lists the number of associated job advertisements). For the other portals, tags were crawled from the autocomplete function of the search field (or box) that job seekers use (API query). This exercise was done on 17 July 2015 (in the afternoon). For more technical details on web crawling, we refer to Carnevale et al. (2014).

For each of the four portals, we first obtain **the number of available job advertisements**. These numbers are reported in **Table 2**. In total, the portals contained approximately **74,000 vacancies** (or 73,923 vacancies to be precise). The Czech job board (*www.jobs.cz*) counted close to 15,300 advertisements, the Hungarian portal (*www.profession.hu*) covered about 11,200 vacancies, the Polish job board (*www.pracuj.pl*) published about 36,000 advertisements, and the Slovak portal (*www.profesia.sk*) had close to 11,300 vacancies. At this point, all occupations are included in our analysis (regardless of the amount of vacancies available for individual occupations or the fact that an occupation can be found in one country but is not present in the other three).

Table 2. Overview of the online job portals used and the number of job advertisements available for the four countries in our sample

	Online job portal on which the vacancies were found	Total number of vacancies available on the job board
Czech Republic	www.jobs.cz	15,269
Hungary	www.profession.hu	11,231
Poland	www.pracuj.pl	36,079
Slovakia	www.profesia.sk	11,344

6. … we examined employers' language demands in the region

In order to identify the foreign language skills demand in the Visegrad region, we use the tags that the online job portals attach to their advertisements (as indicated above, these tags allow job seekers to easily select the vacancies that best suit their qualifications, experience and interests). We **count how many job advertisements contain language requirements**, i.e. how

many of these vacancies are tagged "English", how many of them carry the tag "German", how many are tagged "Russian", and so on), and then examine which language skills are demanded the most (for which 'tag' do we record the highest number of vacancies). We focus on several sets of languages in this analysis: the main languages spoken across Europe, in the neighbouring countries, and so on. Note that we do not distinguish between reading, writing, listening and speaking skills.

Box 1. Illustration for profesia.sk on how to obtain the number of available vacancies in general and by occupation, and the percentage of those that request specific language skills – see Examples 1 and 2 below

On 14 January 2016, we find 10,914 vacancies on profesia.sk (blue square,

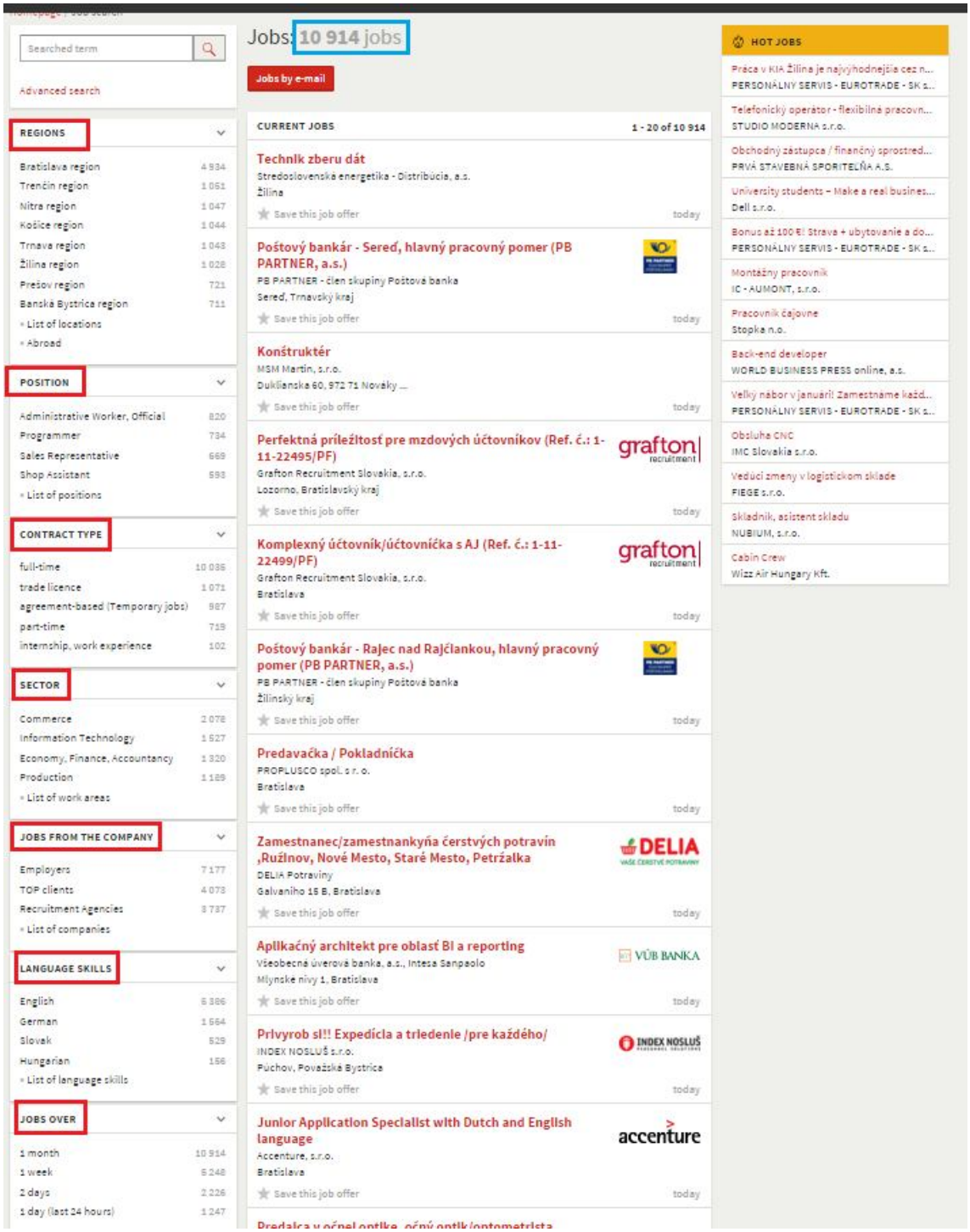
Example 1). Of these vacancies, 5,386 demand English (49%) and 1,564 require German (14%). Other criteria that users can select to filter occupations are region, contract type, sector and so on (red squares,

Example 1). A similar exercise can be done for individual occupations (or positions, as they are labelled on the website). To this end, we first select an occupation for the list of positions. In this case, we selected "accountant". On profesia.sk, we found 471 vacancies for accountants (as indicated by the blue square in

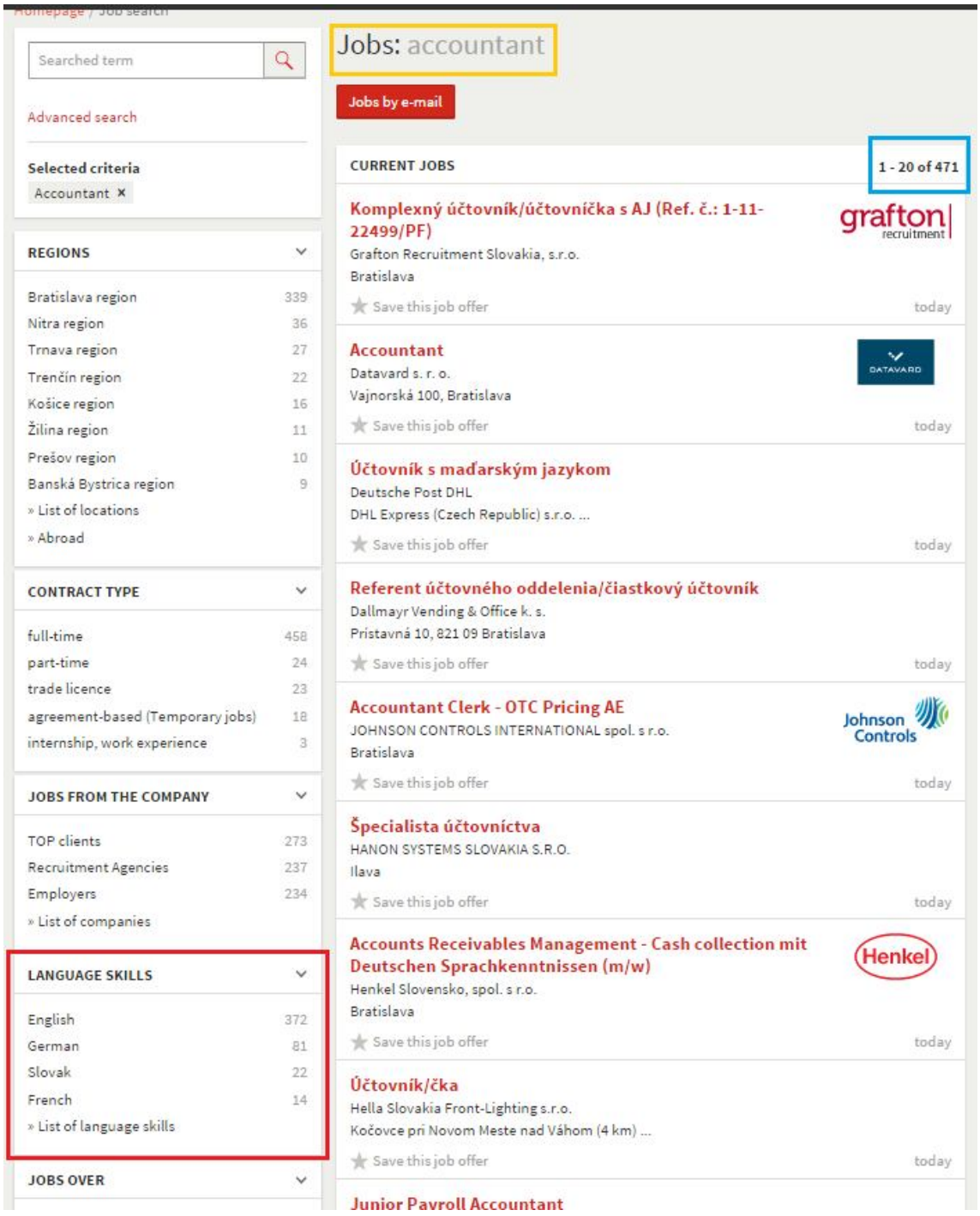
Example 2, where we are looking at vacancies 1-20 of this list). Again, we here have the option to use other filters, such as sector, company or language skills demanded. In terms of language skills, we detect that of the 471 job advertisements for accountants, 372 demand English (79%) and 81 require German language skills (17%) (red square,

Example 2). We follow this two-step process throughout this paper: we consider the full set of vacancies to derive the demand for language skills and then we focus on those individual occupations that we can identify in all four countries and for which in each case at least 30 vacancies are found.

Example 1. *Illustration of how one can derive the total number of vacancies and the number of vacancies that request specific language skills for the Slovak case in our analysis (profesia.sk). The total number of vacancies is indicated by the blue square, the red squares point to all selection criteria that one can use to filter vacancies (region, position, contract type, sector, company, language skills and publication time).*



***Example 2**. Illustration of how one can derive the number of vacancies for a specific occupation and the share of vacancies that request specific language skills for the Slovak case in our analysis (profesia.sk). The orange square indicates the occupation (labelled "position" on the website) that we are interested in (accountant), the blue square shows the total number of vacancies available for this occupation, i.e. 471, and the red square indicates the number of available vacancies that also request certain language skills (372 out of the 471 accountant positions demand English, 81 out of the 471 require German and so on).*



7. Language skills are high in demand in the Visegrad group, but major differences emerge across languages and countries

Of the job advertisements published on the Czech portal, 64% are tagged "does not require any foreign languages". This share is equal to 25% for Hungary and 43% for Slovakia. As no such tag is available on the Polish job board, we do not have information on the share of job advertisements that do not require any foreign language skills in this case (note that we cannot simply calculate this number, as a single job advertisement may have multiple tags). From these percentages it is clear that there are considerable differences between the four countries that make up the Visegrad group. Foreign language skills are much more demanded on the Hungarian and Slovak labour markets than in the Czech Republic. In addition, foreign language skills do appear to matter to employers, as they are **requested in one-third to three-fourths of all vacancies**.

We then focus on the individual languages, for which we report results in **Table 3**. When we consider **all job advertisements at once (for the Visegrad region as a whole)**, we notice that 52% of them require English language skills, 12% demand German language skills, 2% list French language skills and less than 2% request Italian, Spanish or Russian language skills. However, these aggregates likely hide differences between the countries and could certainly be affected by the number of vacancies for each country. For these reasons, we also look at the percentage of job advertisements within each country that comprises these language demands.

Table 3. Percentage of job advertisements for each country and in total that list language requirements

	Czech Republic	Hungary	Poland	Slovakia	Total
English	28.19%	38.92%	63.99%	49.26%	51.89%
German	10.15%	10.86%	12.45%	14.59%	12.36%
French	0.65%	1.25%	3.56%	1.50%	2.33%
Italian	0.19%	0.67%	1.65%	0.55%	1.05%
Spanish	0.15%	0.52%	2.13%	0.48%	1.23%
Russian	0.54%	0.21%	1.6%	0.48%	0.96%

Interestingly, in all four countries English is the most frequently demanded language. Nonetheless, while only 28% of the Czech vacancies refer to English language skills, 64% of the Polish advertisements demand English language skills (or, in other words, whereas 28% of all vacancies published on the Czech job board are tagged 'English', this percentage is equal to 64% in the Polish case). For Hungary the share is 39% and for Slovakia it reaches 49%. German is the second most demanded language in all countries of the Visegrad group. For German, the shares seem to differ to a smaller extent. Across the four countries the share of advertisements with German language demands ranges from 10% in the Czech Republic to 15% in Slovakia (again, this means that on the four job portals, between 10% and 15% of all advertisements published is tagged "German"). Even though French, Italian and Spanish are used extensively in the European Union, these three languages are not demanded at all on the Visegrad labour markets. On the job portals, hardly any vacancies are published that carry these tags. This is an interesting finding because all three languages are broadly spoken native

languages, and French and Spanish are also among the five most widely spoken foreign languages in the EU (Eurostat, 2012). Finally, we conclude that the percentage of advertisements that refer to other languages, which also consists of languages spoken by minority groups within the country or in the neighbouring countries, is very low (less than 1%).

8. We then focus on 59 occupations for which about 66,000 vacancies are retained...

As a next step in our empirical analysis, we concentrate on the foreign language requirements for individual occupations in each of the Visegrad countries. As indicated above, we do not limit our work to English, but also consider German and other foreign languages. Our aim is to arrive at a set of occupations that are present in all Visegrad countries and for which we could find a sufficient number of advertisements. To this end, we refine our analysis in the following way: first, we obtain a **list of all occupations** offered on the four job boards (we have already counted how many vacancies are available for this full list, as reported in **Table 2**). We start from the full list of occupations and the total number of advertisements available on each of the four portals. For each of these occupations, we know the percentage that requires English, German or another foreign language. Then, for each Visegrad country, we **remove from this list the occupations for which fewer than 30 vacancies are published** on the job portal. This implies that about 10% of the vacancies are discarded in our further analysis. More precisely, we no longer consider 11% of the job advertisements published on the Czech portal; for the Hungarian, the Polish and the Slovak job boards the percentages are 7%, 12% and 9% respectively. The number of vacancies and occupations that we still consider after this step is reported in **Table 4**.

Table 4. Overview of the number of job advertisements and the number of occupations available for the four countries in our sample (for those occupations for which at least 30 vacancies are available).

	Number of occupations available after removing those for which fewer than 30 vacancies are found	Number of vacancies available after removing occupations for which fewer than 30 vacancies are found
Czech Republic	171	13,589
Hungary	170	10,445
Poland	205	31,750
Slovakia	181	10,323

As a second step, we **matched the occupations across the countries**, which proved to be a rather difficult task. First, we translated the occupations (their occupational titles) to English and then compared them across the Visegrad group. Occupations that were not represented in each of the four countries were dropped from the sample immediately. For example, if an occupation was found in only one, two or three of the countries, we removed it from our dataset. Then, we mapped the occupations that were present in all countries into each other. For some occupations, this was relatively easy because there was only one suitable match in

each country. For other occupations, more than one possible match was found. The reason why this can occur is that an individual occupation or tag in one country (portal) can be split up into several occupations or tags in the other countries (portals). For example, the tag "teacher" – which is represented by a single tag in the Czech Republic, Hungary and Slovakia – is split into two tags, "teacher" (Nauczyciel) and "instructor" (Wykładowca), in Poland. Another example is that of programmer, for which a job portal can use multiple tags to distinguish between JAVA programmers, Python programmers and other programmers (whereas other job portals simply attach the "programmer" tag to all sub-groups). In these cases, where multiple possible matches arose, a weighted average was calculated (weights equal to the number of job advertisements by occupation). This implies that in some cases the matching is not 'exact' but rather based on whether or not occupations were 'relatively comparable'. This is a minor caveat that one has to be aware of. Nevertheless, the language requirements of the different occupations that were mapped into one single category are highly comparable, i.e. the share of vacancies that demand specific foreign language skills. Altogether **59 occupations** were identified as being sufficiently represented in all four countries (both in terms of the number of available vacancies and presence across the countries). Please note that we do not provide the exact number of vacancies that we retained for each occupation in each country, as each advertisement can carry multiple (occupation) tags. After identifying the 59 occupations, we return to the four job portals and extract the amount of vacancies available for each of these 59 occupations as well as the amount of vacancies that demand certain foreign languages; i.e. that are tagged. From these numbers, we calculated the share. In the hypothetical example that the Slovak job portal would have 500 job advertisements for the "teacher" occupation, i.e. 500 vacancies are tagged "teacher", of which 150 would also be tagged "English", i.e. 150 carry the tags "teacher" and "English", the share would be 0.3.

Table 5 presents the 59 occupations, sub-divided into one column for the high-skilled and one for the low-skilled and medium-skilled occupations, and their **ISCO** code. For all occupations, the corresponding SOC 2010 code was recovered from the web interface of CASCOT, which was then converted into the ISCO-08 classification coding.[3] ISCO, which is short for International Standard Classification for Occupations, is an occupational classification that was introduced by the International Labour Organisation (ILO) in 1958. The most recent version of ISCO was released in 2008 and contains nine major groups of occupations. Occupations are classified into these groups according to the skill **level** and skill **specialisation** needed to perform the job. In other words, in ISCO, occupations are categorised according to their level of complexity. The least complex occupations are the elementary occupations in ISCO class 9. On the other end of the spectrum, we find the most complex occupations, i.e. the managers represented in ISCO class 1. As occupations become more complex, the ISCO code decreases and vice versa. The nine major ISCO classes are: (1) managers; (2) professionals; (3) technicians and associate professionals; (4) clerical support workers; (5) service and sales

[3] CASCOT is a computer program developed by the Warwick Institute for Employment Research. It is designed to make the coding of text information to standard classifications simpler, quicker and more reliable. CASCOT is available at: http://www2.warwick.ac.uk/fac/soc/ier/software/cascot/

workers; (6) skilled agricultural, forestry and fishery workers; (7) craft and related trades workers; (8) plant and machine operators and assemblers; and (9) elementary occupations (not considering the armed forces occupations, ISCO class 0).

Table 5. Overview of the 59 occupations in the sample and their ISCO code

High-Skilled Occupations		Medium- and Low-Skilled Occupations	
ISCO	**Occupation**	**ISCO**	**Occupation**
1135	HR Manager	4226	Receptionist
1211	Financial Manager	4232	Transport Clerk
1213	Operations Manager	4311	Accountant
1221	Marketing Manager	4419	Assistant
1221	Sales Director	4419	Office Worker
1321	Production Director	5120	Cook
2139	Consultant	5222	Sales Team Leader
2141	Industrial Engineer	5223	Retail assistant
2142	Civil Engineer	5230	Cashier
2149	Tester	5242	Financial advisor
2164	Architect	5242	Merchandiser
2211	Doctor	5242	Regional Sales Representative
2221	Nurse	5242	Sales Representative
2330	Teacher	5244	Telesales/Call Centre
2411	Financial Controller	7212	Welder
2411	Tax Advisor	7231	Mechanic
2412	Financial Analyst	7233	Locksmith
2431	Business Analyst	7411	Electrical Mechanic
2431	Key Account Manager	7411	Electrician
2431	Marketing Professional	8121	Labourer
2433	Product Manager	8322	Driver
2511	IT Analyst	8344	Forklift Operator
2512	Programmer	9321	Packer/Auxiliary Labourer
2519	Computer Specialist	9333	Warehouse Worker
2519	Project Manager		
2611	Lawyer		
3112	Technician		
3119	Quality Control		
3122	Foreman		
3323	Buyer		
3341	Office Manager		
3341	Team Leader		
3511	IT Administrator		
3512	Customer Support Worker		
3538	Account Manager		

In their recent contribution, Kureková et al. (2015b) use the ISCO system to distinguish between low-skilled, medium-skilled and high-skilled occupations. The former are occupations with ISCO code 9, the second group consists of occupations with ISCO codes 4 to 8 and the latter holds occupations with ISCO codes 1 to 3. Of the 59 occupations in our sample, six are part of ISCO class 1, 20 of ISCO class 2, nine of ISCO class 3, five of ISCO class 4, nine of ISCO class 5, five of ISCO class 7, three of ISCO class 8 and two of ISCO class 9. Unfortunately, we do not have any occupations in ISCO class 6. From these numbers, one can infer that our sample is composed of 35 high-skilled, 22 medium-skilled and two low-skilled occupations. Occupations tend to be located in the upper half of the ISCO hierarchy and in the ISCO code 2 category. Still, our dataset clearly covers a wide range of occupations, characterised by different levels of complexities and different education, skill and other requirements. Moreover, this sample is a good start for the analysis of employers' language demands across countries and across occupations.

9. ... to examine whether the demand for foreign language skills is related to the level of complexity of an occupation

In this section, we examine whether there is a relation between the complexity of an occupation and the requirements for foreign language skills. Previous research suggests that the demand for English language skills increases when the complexity of an occupation rises (Beblavý et al., 2015). Does this result apply to our sample of countries as well? Can it be extended to other languages, such as German? We set out to find an answer to these questions below. In order to keep results manageable, we first focus on English and then continue with the German language demand. In both cases we first present a table for the high-skilled occupations and then report results for the medium- and low-skilled occupations.

10. More complex occupations are more demanding in terms of the English language demands…

Table 6 and **Table 7** below show the percentage of job vacancies that comprise English language requirements for the high-skilled occupations and for the medium- and low-skilled occupations in each of the Visegrad countries (respectively). As before, for each occupation the number of vacancies that were tagged "English" was assembled. When multiple occupations mapped into one, a weighted average of all occupations that were is used (with the weights being the number of advertisements). In both tables, the occupations for which the highest shares of advertisements that require English are reported are indicated in blue, while the occupations with the lowest demand are indicated in red. A comparison of both tables makes clear that there is a **positive relation between the complexity of an occupation and the demand for English in each of the Visegrad countries**. An increase in the complexity of an occupation is accompanied by a rise in the number of advertisements that refer to knowledge of the English language. There seems to be a high level of similarity in terms of English requirements in the top of the ISCO hierarchy.

When we calculate the average percentages across the high-skilled occupations, we find an average of 67% for the Czech Republic, 65% for Hungary, 62% for Poland and 69% for Slovakia

(in **Table 6**). Across the high-skilled occupations, the shares range from 23% to 88% in the Czech Republic, from 15% to 97% in Hungary, from 22% to 86% in Poland and from 21% to 98% in Slovakia. There does seem to be quite some heterogeneity within ISCO classes. The average shares across the medium- and low-skilled occupations amount to 33% for the Czech Republic, 27% for Hungary, 33% for Poland and 32% for Slovakia (**Table 7**). In this case, percentages range from 3% to 87% in the Czech Republic, 3% to 86% in Hungary, 7% to 73% in Poland and 4% to 87% in Slovakia. Within the group of medium-skilled and low-skilled occupations, interestingly the highest demand is recorded for the occupations in ISCO class 4 (the most complex ones within this group). This applies to all countries in the sample. With regards to the medium- and low-skilled occupations with the lowest demands, there is somewhat more heterogeneity across the countries. Still, for most of them at least two or three of the lowest shares appear in ISCO classes 8 and 9. Another interesting result is that across the countries, some of the ISCO 7 occupations show a relatively high demand for English language skills. This may indicate that these workers are employed by foreign employers or that they work abroad, e.g. a Polish craftsman who works in Belgium.

Table 6. Percentage of vacancies that require English language skills across the V4 for the 35 high-skilled occupations in the sample

ISCO	Occupation	Czech Republic	Hungary	Poland	Slovakia
1135	HR Manager	87%	42%	67%	67%
1211	Financial Manager	63%	54%	62%	50%
1213	Operations Manager	53%	48%	65%	59%
1221	Marketing Manager	71%	95%	79%	86%
1221	Sales Director	53%	45%	49%	51%
1321	Production Director	69%	50%	55%	74%
2139	Consultant	44%	64%	49%	66%
2141	Industrial Engineer	86%	81%	85%	83%
2142	Civil Engineer	23%	24%	22%	34%
2149	Tester	88%	87%	76%	89%
2164	Architect	66%	50%	64%	79%
2211	Doctor	31%	56%	44%	26%
2221	Nurse	27%	30%	64%	21%
2330	Teacher	51%	15%	55%	27%
2411	Financial Controller	83%	78%	72%	93%
2411	Tax Advisor	81%	50%	86%	98%
2412	Financial Analyst	81%	78%	72%	88%
2431	Business Analyst	74%	97%	81%	70%
2431	Key Account Manager	63%	90%	45%	71%
2431	Marketing Professional	68%	85%	55%	71%
2433	Product Manager	83%	94%	74%	74%
2511	IT Analyst	81%	87%	74%	88%
2512	Programmer	82%	84%	77%	85%

2519	Computer Specialist	82%	83%	74%	80%
2519	Project Manager	81%	68%	75%	84%
2611	Lawyer	72%	42%	72%	90%
3112	Technician	56%	35%	34%	46%
3119	Quality Control	72%	61%	57%	50%
3122	Foreman	33%	15%	34%	54%
3323	Buyer	84%	86%	68%	81%
3341	Office Manager	76%	91%	58%	78%
3341	Team Leader	73%	83%	42%	76%
3511	IT Administrator	81%	67%	72%	87%
3512	Customer Support Worker	67%	66%	58%	69%
3538	Account Manager	53%	93%	48%	67%

Note: The five/six occupations with the highest demand are indicated in blue, the five occupations with the lowest demand in red.

Table 7. Percentage of vacancies that require English language skills across the V4 for the 24 medium- and low-skilled occupations in the sample

ISCO	Occupation	Czech Republic	Hungary	Poland	Slovakia
4226	Receptionist	87%	86%	67%	87%
4232	Transport Clerk	70%	69%	57%	65%
4311	Accountant	74%	51%	73%	79%
4419	Assistant	73%	70%	71%	68%
4419	Office Worker	61%	52%	61%	70%
5120	Cook	26%	10%	27%	12%
5222	Sales Team Leader	37%	36%	28%	46%
5223	Retail assistant	25%	15%	29%	15%
5230	Cashier	36%	11%	10%	15%
5242	Financial advisor	10%	59%	18%	10%
5242	Merchandiser	39%	33%	15%	13%
5242	Regional Sales Representative	48%	27%	35%	68%
5242	Sales Representative	41%	36%	29%	38%
5244	Telesales/Call Centre	29%	16%	23%	50%
7212	Welder	3%	6%	39%	10%
7231	Mechanic	20%	10%	32%	16%
7233	Locksmith	4%	7%	44%	8%
7411	Electrical Mechanic	44%	3%	26%	32%
7411	Electrician	23%	6%	42%	16%
8121	Labourer	5%	8%	12%	5%
8322	Driver	21%	3%	19%	18%
8344	Forklift Operator	9%	5%	7%	4%
9321	Packer/Auxiliary Labourer	4%	14%	11%	11%
9333	Warehouse Worker	11%	7%	10%	13%

Note: The five occupations with the highest demand are indicated in blue, the five occupations with the lowest demand in red.

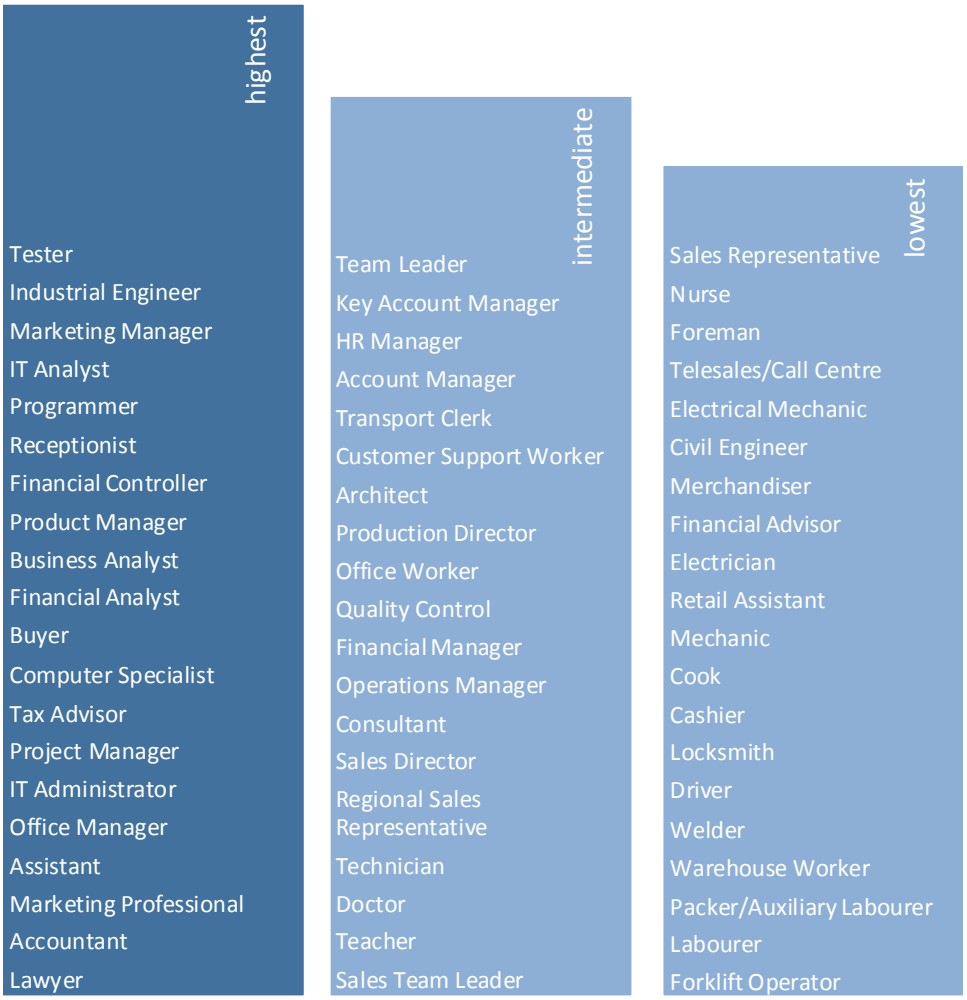
Nonetheless, the standard deviation within each of the ISCO groups, as reported in **Table 8**, is somewhat higher in some cases. This finding suggests that ISCO groups are not necessarily homogeneous, which already became clear in **Table 6** and **Table 7** too.

Table 8. Standard deviations of English language demand within ISCO classes for each of the V4

ISCO	Czech Republic	Hungary	Poland	Slovakia
1	0.13	0.20	0.10	0.14
2	0.21	0.25	0.16	0.24
3	0.16	0.27	0.14	0.15
4	0.09	0.15	0.07	0.09
5	0.11	0.16	0.08	0.21
7	0.17	0.03	0.07	0.09
8	0.08	0.03	0.06	0.08
9	0.05	0.05	0.01	0.01

As a next step in our analysis, we again consider the four countries in the Visegrad region as a whole but do distinguish between the 59 individual occupations. In this way, we aim to discover for which occupations the demand for English language skills is high/low. Moreover, we also aspire to get more insight into the homogeneity of demand in the region. We therefore extend our analysis. **Figure 8** presents the classification of the 59 occupations across the Visegrad Four into three distinct groups, i.e. highest, intermediate and lowest demand. This classification is based on the requirements for English language skills in the advertisements for each individual occupation: we calculate the sum of the percentage of vacancies that demand English in the Czech Republic, the share of job advertisements that demand English in Hungary, the percentage of vacancies that require English in Poland and the share of advertisements that require English in Slovakia. For example, for the occupation "HR Manager", this total is equal to 87% + 42% + 67% + 67% = 263% (see **Table 6** and **Table 7** for the percentages). When we compute the total for each occupation, we notice that it ranges from 25% (forklift operator) to 340% (tester). On the basis of these numbers, we create three tertiles: one that covers the occupations with the highest demand, i.e. when the sum exceeds 275%, one that comprises the occupations with the lowest demand (sum is below 145%) and one that holds the occupations with an intermediate demand for English language skills (sum between 145% and 275%). The first two groups each include 20 occupations, the latter counts 19 occupations. In **Figure 8**, the three groups of occupations are presented in three columns. Note that in each column, the occupations are arranged according to their percentage: the occupation with the highest demand within each group is depicted on top, the occupation with the lowest demand is shown at the bottom. From the Figure, we derive that the demand for English language skills is the highest in managerial, professional, technical, administrative and IT-related occupations. On the lower side of the distribution, we mainly find manual labour jobs. **Figure 8** illustrates the positive relation between complexity and the demand for English language skills, this time for the Visegrad group as a whole.

Figure 8. Classification of occupations into three classes depending on the demand for English language skills across the V4



We then consider to what extent the demand for English language skills is homogenous across countries for the 59 occupations in our sample. To test the **homogeneity of demand**, we calculated the mean, standard deviation, minimum and maximum of the percentages of job advertisements for individual occupations that require the English language in the four countries. More precisely, first we calculate the standard deviation of the percentages of vacancies that require English for each occupation. For example, for HR managers, the standard deviation is 0.18. Then, we compute the average of all these standard deviations (which is equal to 0.106698) and its standard deviation (which is 0.056616). In order to evaluate the homogeneity of demand across the Visegrad Four for each of the occupations, we come up with three groups. The first group comprises all occupations for which the standard deviation falls within the boundaries of 0.05-0.16, i.e. the average minus/plus one standard deviation. In this group, we find 36 occupations. For these occupations, we consider the demand for English language skills across the four countries to be homogenous. The second group of

occupations is composed of all occupations for which the standard deviation is within the boundaries of -0.01-0.05 or 0.16-0.22, i.e. between the average minus/plus two standard deviations and the average minus/plus one standard deviation. In this case, we detect 22 occupations for which we consider demand to be somewhat more heterogeneous. For 1 of the 59 occupations, "financial advisor", the standard deviation exceeds the level of the average plus two standard deviations. For this occupation, about 10% of the job advertisements demand English in the Czech Republic and Slovakia. This number is 18% for Poland and 59% for Hungary. The demand for English for the financial advisor occupation can be denoted as heterogeneous. Overall, for the knowledge of English, employers' demand can be regarded as relatively to very homogenous in the Visegrad group.

11. ... but this does not hold for German language skills

We then perform a similar analysis to assess the demand for German language skills in the Visegrad Four. We again first consider individual occupations within each country (subdivided into high-skilled occupations on the one hand and low-skilled and medium-skilled occupations on the other hand) and then continue with an analysis of the homogeneity of demand. For each occupation, the number of vacancies that were tagged "German" on the different job boards was compiled. When multiple occupations map into one, a weighted average of all occupations is used (with the weight being the number of vacancies).

Employers' **demand for German language skills, however, seems unrelated to the complexity of the occupation of interest**. Across the high-skilled occupations in **Table 9**, the average share of vacancies that list German language skills is equal to 12% in the Czech Republic and Hungary, 11% in Poland and 15% in Slovakia. The shares vary between 0% and 31% in the Czech Republic, 0% and 34% in Hungary, 1% and 35% in Poland and 0% and 34% in Slovakia. For the low-skilled and medium-skilled occupations in **Table 10**, the average percentages of job advertisements that include a German language demand is 9% in the Czech Republic and Hungary, 10% in Poland and 15% in Slovakia. In this case, percentages range from 0% to 27% in the Czech Republic, 1% to 29% in Hungary, 0% to 42% in Poland and 1% to 34% in Slovakia. These numbers suggest that there is not so much variation across occupations with different levels of complexity: the averages and range are relatively similar for the high-skilled and the medium- and low-skilled occupations in all countries. A comparison of the patterns detected across the four countries also reveals larger heterogeneity across the countries. The standard deviations within ISCO groups are depicted in **Table 11**.

In the Czech Republic, of the 10 occupations with the largest requirements for German language skills, one belongs to ISCO 1, three to ISCO 2, four to ISCO 3 and two to ISCO 4. In Hungary, four are part of ISCO 2, four of ISCO 3, one of ISCO 4 and one of ISCO 7. For Poland, the 10 occupations with the biggest demand for German skills are divided as follows: four belong to ISCO 2, three to ISCO 3, one to ISCO 4, one to ISCO 7 and one to ISCO 8. Finally, for Slovakia the numbers are one in ISCO 2, four in ISCO 3, three in ISCO 4 and two in ISCO 5. These results seem to suggest a very slight tendency to have a higher demand in somewhat more complicated occupations. This can be explained by the observation that more complex occupations are more demanding in general. In addition, German language skills are strongly

demanded in some of the medium-skilled and low-skilled occupations: two out of 10 occupations in Hungary, three out of 10 in Poland and five out of 10 in Slovakia. Especially workers in ISCO classes 3 and 4 potentially are technicians, associate professionals and administrative workers, who are employed in outsourced shared service centres.

A comparison of the percentage of job advertisements that requires English language skills with the percentage of advertisements that requires German language skills for each occupation and each country reveals **that in the vast majority of the cases the share demanding English exceeds the share that demands German**. Only in 14 of the 236 cases do more advertisements list German than English. These cases are: cook (Slovakia), driver (Poland and Slovakia), electrician (Hungary and Slovakia), welder (all countries), electrical mechanic (Hungary), locksmith (Czech Republic, Hungary and Slovakia) and nurse (Slovakia). Especially for the welders, German appears to be an important skill. Another interesting result is the case of nurses in Slovakia, where 21% of the vacancies demand English and 34% German. This is one of the largest recorded differences.

Table 9. Percentage of vacancies that require German language skills across the V4 for the 35 high-skilled occupations in the sample

ISCO	Occupation	Czech Republic	Hungary	Poland	Slovakia
1135	HR Manager	11%	15%	7%	19%
1211	Financial Manager	6%	9%	6%	7%
1213	Operations Manager	10%	11%	3%	14%
1221	Marketing Manager	4%	4%	4%	0%
1221	Sales Director	12%	9%	7%	10%
1321	Production Director	28%	16%	10%	23%
2139	Consultant	6%	11%	12%	0%
2141	Industrial Engineer	31%	34%	10%	23%
2142	Civil Engineer	3%	10%	5%	7%
2149	Tester	6%	22%	4%	9%
2164	Architect	24%	19%	12%	18%
2211	Doctor	3%	3%	16%	8%
2221	Nurse	5%	2%	28%	34%
2330	Teacher	8%	0%	14%	21%
2411	Financial Controller	7%	7%	3%	12%
2411	Tax Advisor	16%	5%	16%	0%
2412	Financial Analyst	12%	4%	3%	11%
2431	Business Analyst	8%	6%	6%	10%
2431	Key Account Manager	13%	8%	2%	14%
2431	Marketing Professional	4%	8%	6%	8%
2433	Product Manager	7%	9%	5%	14%
2511	IT Analyst	0%	10%	3%	10%
2512	Programmer	11%	13%	10%	9%
2519	Computer Specialist	21%	18%	16%	20%

2519	Project Manager	7%	15%	9%	12%
2611	Lawyer	13%	16%	9%	23%
3112	Technician	19%	14%	9%	24%
3119	Quality Control	27%	22%	35%	20%
3122	Foreman	15%	4%	33%	16%
3323	Buyer	26%	22%	3%	30%
3341	Office Manager	18%	13%	34%	32%
3341	Team Leader	4%	15%	8%	6%
3511	IT Administrator	5%	20%	7%	4%
3512	Customer Support Worker	14%	19%	14%	31%
3538	Account Manager	8%	9%	1%	14%

Note: The occupations with the highest demand are indicated in blue, the occupations with the lowest demand in red.

Table 10. Percentage of vacancies that require German language skills across the V4 for the 24 medium- and low-skilled occupations in the sample

ISCO	Occupation	Czech Republic	Hungary	Poland	Slovakia
4226	Receptionist	5%	8%	7%	34%
4232	Transport Clerk	27%	29%	9%	23%
4311	Accountant	16%	13%	23%	21%
4419	Assistant	18%	14%	14%	26%
4419	Office Worker	16%	16%	14%	28%
5120	Cook	0%	1%	5%	13%
5222	Sales Team Leader	10%	9%	0%	14%
5223	Retail assistant	16%	4%	6%	4%
5230	Cashier	4%	1%	0%	3%
5242	Financial advisor	1%	12%	3%	2%
5242	Merchandiser	4%	6%	0%	1%
5242	Regional Sales Representative	10%	12%	7%	26%
5242	Sales Representative	9%	10%	6%	10%
5244	Telesales/Call Centre	5%	2%	11%	25%
7212	Welder	5%	18%	42%	14%
7231	Mechanic	10%	10%	13%	12%
7233	Locksmith	5%	8%	14%	13%
7411	Electrical Mechanic	17%	12%	8%	17%
7411	Electrician	12%	13%	15%	23%
8121	Labourer	3%	4%	3%	3%
8322	Driver	9%	3%	22%	21%
8344	Forklift Operator	5%	3%	5%	4%
9321	Packer/Auxiliary Labourer	4%	8%	6%	7%
9333	Warehouse Worker	7%	5%	6%	7%

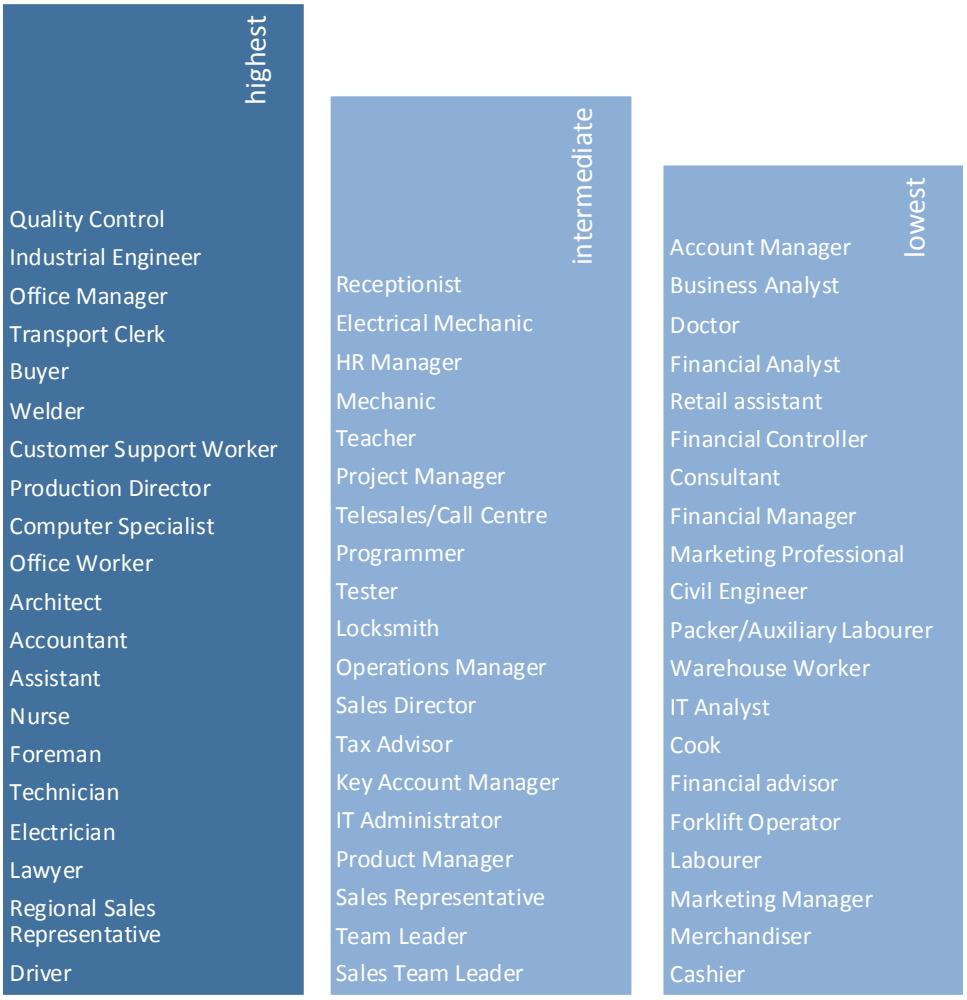
Note: The occupations with the highest demand are indicated in blue, the occupations with the lowest demand in red.

Table 11. Standard deviations of German language demand within ISCO classes for each of the V4

ISCO	Czech Republic	Hungary	Poland	Slovakia
1	0.08	0.04	0.02	0.08
2	0.08	0.08	0.06	0.08
3	0.08	0.06	0.14	0.11
4	0.08	0.08	0.06	0.05
5	0.05	0.05	0.04	0.10
7	0.05	0.04	0.13	0.04
8	0.03	0.01	0.10	0.10
9	0.02	0.02	0.00	0.00

Similarly as before, we again switch to the regional aggregate (which means that the Visegrad countries are used as a single unit in the following analyses; we do not exploit the cross-country variation) but keep the occupational dimension. In Figure 9, we present a classification of the 59 occupations into three categories which – as before – reflect the highest, intermediate and lowest demand for German language skills. For each occupation, this classification builds on the sum of the percentages of the job advertisements that request knowledge of the German language in the Visegrad countries. We again add up the percentage of vacancies that demand German in the Czech Republic, Hungary, Poland and Slovakia. For the example of the HR Manager, the total is equal to 52%; it is the sum of 11% (in the Czech Republic), 15% (Hungary), 7% (Poland) and 19% (Slovakia) (these percentages can be found in Table 9 and Table 10). When the 59 occupations are considered, we find that the total ranges from 8% (cashier) to 104% (quality control). As a next step, we construct three tertiles from the totals obtained. The results of this exercise are shown in Figure 9. The first tertile is composed of the 20 occupations with the highest demand for German language skills, i.e. when the total exceeds 55%. The second group comprises 20 occupations for which the lowest demand for German is recorded (in this case, the total lies below 32%). For the last group of occupations, the demand for German is 'intermediate' (19 occupations, sum between 32% and 55%). As before, the three groups are presented in three columns in Figure 9 and in each column occupations are ranked from high to low according to the total share of advertisements that require knowledge of the German language. In comparison to the results for English, we now also find several 'manual' occupations in the group with the highest demand for language skills.

Figure 9. Classification of occupations into three classes depending on the demand for German language skills across the V4



We then analyse the **homogeneity** of the demand for German language skills in the region, using a similar approach as before. First, we calculate the standard deviations for each occupation and then we compute the average of all these standard deviations (which is equal to 0.057458 in this case) and its standard deviation (which amounts to 0.0363309). We calculate the boundaries as before: the average minus/plus one standard deviation (range of 0.02–0.09), the average minus/plus two standard deviations (levels of -0.02 and 0.13). In this case, we find that demand for German language skills is homogenous for 38 occupations in the Visegrad region (standard deviations fall within 0.02-0.09). Besides these 38 occupations, there are 18 occupations with standard deviations that either take a value in the interval "(average minus two standard deviations)-(average minus one standard deviation)" or in the interval "(average plus one standard deviation)-(average plus two standard deviations)". The demand for German is somewhat more heterogeneous for these occupations. Finally, the demand for German language skills can be regarded as a heterogeneous demand for three occupations (again, the standard deviation is higher than the average plus two standard deviations). These

three occupations are: receptionist, nurse and welder. For receptionists, German is demand in 8% of the vacancies in Hungary, 7% of the vacancies in Poland and 5% of the vacancies in the Czech Republic. In Slovakia, however, it is requested in 34% of the job advertisements. A similar pattern is detected for nurses: whereas German is demand in 34% of the vacancies in Slovakia and 28% of the vacancies in Poland, it is only mentioned in 5% of the Czech advertisements and in 2% of the Polish advertisements. In the case of welders, we notice that 42% of the Polish vacancies refer to German. In Hungary, the share is 18% and in Slovakia it is 14%. In the Czech Republic, German again seems to be much less important for this occupation as it is only requested in about 5% of the advertisements. These results suggest that the largest differences between the four countries can be found for welders. Moreover, they also show that German appears particularly relevant in Slovakia and Poland. Still, employers' demand for German language skills can be regarded as rather homogenous in the Visegrad case.

Finally, note that when we calculate the correlation between the demand for English and German language skills for each country, we find a correlation of 0.11 in Poland, 0.23 in Slovakia, 0.38 in Hungary and 0.41 in the Czech Republic. These correlations are relatively low to medium-sized.

12. For the Czech Republic and Slovakia, the share of vacancies that demand English is correlated with the hourly wage ... but such a relationship does not exist for German language skills

For two of the Visegrad countries, the Czech Republic and Slovakia, we were able to find data on the hourly wages (expressed in the national currency) for some occupations. These wage data are based on the median hourly gross wages, obtained from the WageIndicator web surveys collected from 2013 through 2015. Our data cover 53 occupations for the Czech Republic and 36 occupations for Slovakia. We combine the data for both countries and calculate the correlations between the percentage of advertisements that refer to the language skills and the hourly wages. Our results are presented in **Figure 10** (English) and **Figure 11** (German) (in both cases, the Czech Republic is indicated on the right axis). While there is a clear positive correlation between the shares of vacancies that require English and wages in both countries (which could reflect that English skills are related to the complexity of an occupation, the same applies to wages), the correlation between the German language demand and wages is much weaker and even negative for the Czech Republic. The latter seems to suggest that German language skills are particularly relevant in the occupations in the lower segment of the wage distribution, which likely are part of the lower segment of the ISCO classification, i.e. relatively less complex.

Figure 10. Correlation between the share of job advertisements that require English and the hourly wages in the Czech Republic and Slovakia

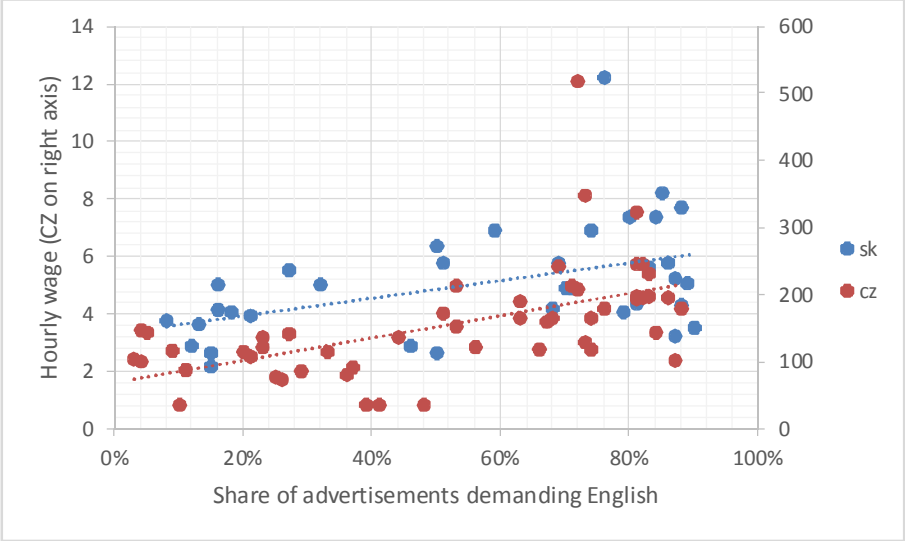
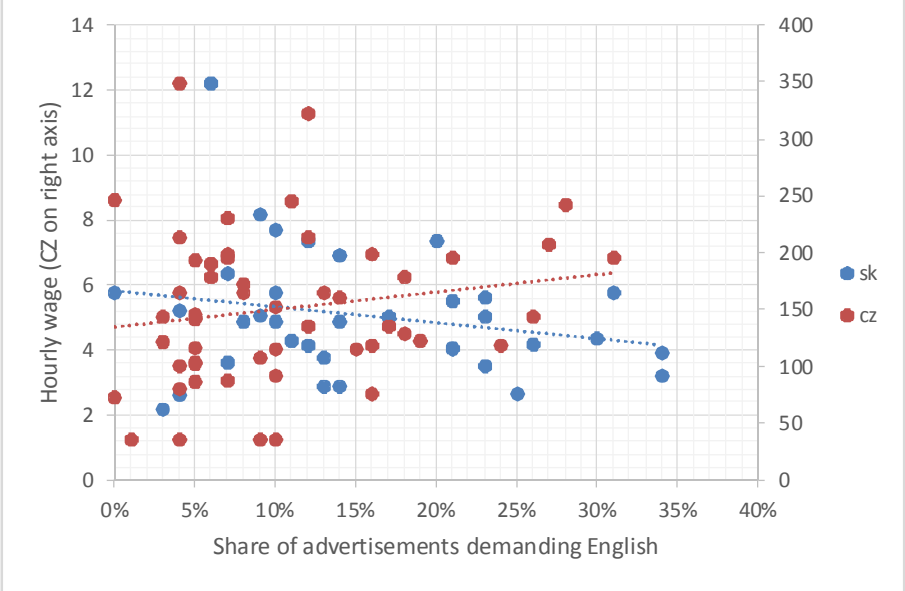


Figure 11. Correlation between the share of job advertisements that require German and the hourly wages in the Czech Republic and Slovakia



13. Conclusions

In this research note, we use a sample of **approximately 74,000 job advertisements** published on leading online job boards in the four countries that constitute the **Visegrad group** (the Czech Republic, Hungary, Poland and Slovakia). With this sample, we examine the demand for foreign language skills in each of the Visegrad countries. We first examine whether foreign

languages are demanded on the labour market and then analyse which languages are particularly important. We then focus on a sample of 59 occupations, that could be identified in each of the countries and for which a sufficient number of vacancies was available (thus reducing the number of vacancies that we consider to about 66,000). Of the 59 occupations, two are low-skilled, 20 are medium-skilled and 35 are high-skilled. The Visegrad case is a **particularly interesting one,** since the region is relatively open to foreign investment and international trade (and English is the leading business language globally). Moreover, there are important historical, cultural and economic ties with the neighbouring countries Germany and Austria (which means that German can also play a role on the labour market) and shared a border with the former Soviet Union. In addition, in none of the countries is the main national language among the most widely spoken languages in Europe. This implies that it is not so straightforward to predict which language skills will be in highest demand in the Visegrad region: English, German, Russian or even another language? We contrast our results for labour demand with details on the **supply of foreign language skills** (from the Eurobarometer survey conducted in 2012).

In our work, we exploit the cross-occupation and the cross-country dimensions of our dataset, meaning that we slice the data to compare the same occupation in different countries on the one hand and to differentiate between different occupations within a country on the other hand. First, we analyse **how many job advertisements** list foreign language skills among the qualifications and skills required. We find that this number varies from one-third to three-fourths of the vacancies considered (depending on the country examined). As a next step, we explore we **which languages** are demanded the most (focusing on English, German and other languages). In the Visegrad region, **English is the most demanded foreign language**: 52% of the vacancies require English language skills. Still, only between 25% and 33% of the population in the Visegrad Four is able to have a conversation in English. We also find a positive relationship between an occupation's complexity on the one hand and the demand for English language skills on the other hand. In the Visegrad Four, **German** is the second most requested language, it appears in **12**% of the advertisements. Interestingly, between 15% and 22% of the population has sufficient German language skills to hold a conversation in the language. For German, there is **no clear link** between the demand for language skills and the complexity of an occupation. Other languages, such as French, Italian, Spanish and Russian, are only requested in **a small minority of the vacancies**.

With this research note, we aim to contribute to the literature of web-based labour market research (Askitas & Zimmermann, 2015). In our work, we concentrate on the demand side of the labour market. Our work focuses particularly on the skill dimension and can therefore be of interest to job seekers who want to discover employers' foreign language demands for specific occupations, and to education institutes, employment agencies and governments.

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