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What Employers Actually Want

Skills in demand in online job vacancies in Ukraine

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Abstract

We explore online job vacancies from a Ukrainian website to assess the skills that employers look for among their new hires. We assess the demand for cognitive, socioemotional, and technical skills across a range of medium- and high-skilled occupations. We find that employers highly demand all three skills categories, much more than any education level. Most occupations demand a variety of different socioemotional skills while the demand for cognitive and technical skills focuses on one or two skills. Besides, cognitive and socioemotional skills appear as complementary: They are demanded similarly for a given occupation. Overall, online job vacancies are an informative complement to traditional sources to assess skills in demand.

Keywords: Ukraine, web scraping, online job vacancies, job requirements, cognitive skills, socioemotional skills, technical skills, education, work experience, private job website.

JEL codes: J23, J24, J63.

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1. Motivation

1.1. Identifying employers' demand for skills matters for firms and aspiring workers

Understanding what skills employers look for in their future employees can help building policies for a more productive workforce, more efficient firms, and a more prosperous society. Workers with better skills — the attributes they use to successfully handle a range of tasks or situations — can perform their jobs more efficiently, use new technology better, and innovate.[2] If workers' skills match their employers' demand, they become better at their job, firms' performance increases and firms move up the value chains, which would allow to increase the productivity of the Ukrainian economy and the country's prosperity.

At the same time, understanding what employers look for is also important for current students and jobseekers in Ukraine to make decisions on education and training. For youth, deciding on which studies and career to pursue can be daunting. Some know from an early age which profession they want. Others have a particular interest in fields of studies such as science, history, or the arts. Many others wonder what would be best for them. To help the latter make a decision, it might be useful to have access to information such as: what are the daily tasks of a given occupation? How rewarding are occupations? What kind of skills, education, and experience are needed to access a given job? Older jobseekers, who passed studying age and are looking for retraining opportunities, wonder the same. A number of high-income countries provide public career websites gathering that kind of information. In countries where that kind of information is not available, such as Ukraine, students and jobseekers can only count on the opinions of their circles or their own views.

1.2. Traditional sources of information do not capture well employers' demand for skills

Employer surveys can give incomplete or biased information about skills in demand. The sampling of an employer survey follows a clear protocol to ensure it is representative of firms within an industry or a country, for example. However, the sampling frames for employer

[2] Arias and others (2014).

surveys are based on firm registries that are often outdated, and employer surveys often have high non-response rates. Combined, these two issues likely distort the representativeness of firm surveys. For example, the World Bank's 2014 Ukraine STEP Employer Survey and the 2013 Ukraine Enterprise Survey have non-response rates of 50 and 35 percent, respectively.[3] Moreover, once conducted, surveys often miss two dimensions of information: 1) actual, rather than declared, information: Employers could, for instance, declare they are looking for workers with certain skills because a survey asked them about these skills but the actual skills they advertise may be different; 2) detailed information: Surveys are time-limited and may not allow collecting all desired detailed data (including on skills) because it is too time consuming.

In the case of Ukraine, key information on the labor market and on skills in demand is missing. Existing labor-market information includes wage data from official records, household surveys featuring self-reported living standards and employment status, and employer surveys featuring self-reported firms' practices and constraints. There are no regular employer surveys that cover the demand for skills in Ukraine. There are some existing ad-hoc national employer surveys on demanded skills but only for a limited number of industries. For example, the World Bank's 2014 STEP Employer Survey, which collected detailed information on employers' demand for skills among their current employees and future hires, only covered four sectors, and thus a limited fraction of employment and

[3] For information on the 2014 STEP Employer Survey, see Del Carpio, Kupets, and Muller (2017). For information on the 2013 Enterprise Survey, see the Ukraine Implementation Report at: http://microdata.worldbank.org/index.php/catalog/1986.

economic activity.[4] As for household surveys, they rarely include measures of respondents' skills and, when they do, they only give a partial view of skills in demand.[5]

When collected, existing official records of job vacancies are little detailed in Ukraine. At the time of writing, the State Employment Service regularly collected data on job vacancies published on its website, Trud.gov.ua (Trud hereafter), but the State Employment Service did not analyze the content of job descriptions and job requirements. The State Employment Service only collected the level of the wage offers and, when compiling the data, only showed the breakdown of the numbers of job vacancies by location and industry. Besides, Trud captures a subset of employers' demand that is typically focused on low-skilled jobs. Indeed, even though they are required to, many firms do not even advertise job vacancies to the State Employment Service because jobseekers using public employment services typically have low skills.[6]

2. New, detailed data to understand employers' demand for skills in Ukraine

The main objective of this paper is to introduce online job vacancies as a source to measure employers' demand for skills in Ukraine. In 2015, we used web scraping, a technique to extract data from websites, to collect job vacancies from HeadHunter Ukraine (HeadHunter hereafter). HeadHunter is one of the most popular private job websites in the country, with the major advantage that most advertised vacancies provide detailed information on the required skills. This paper analyzes the content of a dataset containing more than 2,500 of

[4] For details on the World Bank's 2014 Ukraine STEP Employer Survey, see Del Carpio, Kupets, and Muller (2017). The four sectors, picked for their strong economic and employment potential, are: agriculture, food processing, information technology, and renewable energy.

[5] If it includes individuals' measures of skills, household survey data can tell which skills correlate with higher probability of employment and higher wages, with all other measured characteristics constant, but not if these outcomes are the result of matching with employers' demand or a multitude of other unexplained factors.

[6] Kupets (2010).

these online job vacancies, in detail for the sixteen most-demanded occupations, to identify the most demanded skills.

To the best of our knowledge, this is the first attempt to analyze the content of job vacancies in Ukraine, a type of information that is not available with other sources. The analysis of job vacancies allows gathering richer and more disaggregated information than existing official records and survey data. It allows determining a set of key skills, without imposing terms to designate skills or making surveyed firms rate the importance or absence of skill within a pre-defined list of skills. This can be done at a more disaggregated level of occupations than most employer skills surveys. In addition, job vacancies allow identifying the nature of demanded job-specific technical skills. In employer skills surveys, such as the World Bank's STEP Employer Surveys, the importance or absence of technical skills is often based on questions that consider technical skills as a broad, undefined set.[7]

3. Data collection and description

3.1. Web scraping and sample

Data was collected using web scraping, a technique to extract data from websites, allowing to capture online job vacancies that were posted in HeadHunter, a popular private website (see appendix A for details on the data collection). After data cleaning, an exclusion of "professional areas" (the website's job categories mixing occupations and sectors) with a small number of observations, and a random sampling of vacancies for easier classification, the sample includes 2,565 vacancies posted between February 27th and March 26th, 2015.

3.2. The online job website HeadHunter and its representativeness

Created in 2000, HeadHunter is a leader among private job websites in Ukraine. The Ukraine website is part of an international group that also operates in the Baltic States (Estonia, Latvia,

[7] An exception is the World Bank's 2012 STEP-Enterprise Survey of the Lao People's Democratic Republic, which includes details questions of technical skills customized for each surveyed sector. Survey materials are available at this link: http://microdata.worldbank.org/index.php/catalog/1543.

and Lithuania), Belarus, Kazakhstan, and Russia. On the Ukraine website, a small share of ads (5 percent) are for vacancies outside of Ukraine, predominantly in Russia and Belarus. Vacancies can be posted in Ukrainian, Russian, and English.

The job vacancies of HeadHunter do not represent employers' demand for the whole spectrum of jobs in Ukraine, but rather cover medium- and high-skilled ones. HeadHunter is only one job website among a few in Ukraine, which are likely to advertise different vacancies.[8] In addition, firms also use informal networks to hire (e.g. references by other colleagues without publicly advertising the job).[9] Therefore, HeadHunter may represent only a segment of the overall jobs and skills' demand. Indeed, while HeadHunter includes vacancies for clerical occupations, it over-represents formal, high-skilled jobs compared to the structure of employment in Ukraine. The proportion of HeadHunter's vacancies of "senior officials and managers" and "technicians" is more than double that of employed individuals in 2015 (figure 1, panel A).[10] There is also a higher proportion of professionals (close to half more) and clerks (more than five times more). Headhunter has a much lower proportion of less skilled occupations: service and sales workers, skilled agricultural workers, craftspersons, machine operators, and laborers. HeadHunter's vacancies also overrepresent occupations in

[8] Other online job websites include Jobs.ua (27,544 vacancies in March 2017), Rabota.ua (57,701 vacancies in February 2017), and Work.ua (78,695 vacancies in March 2017) (sources: respective websites and www.jobboardfinder.net for Rabota.ua).

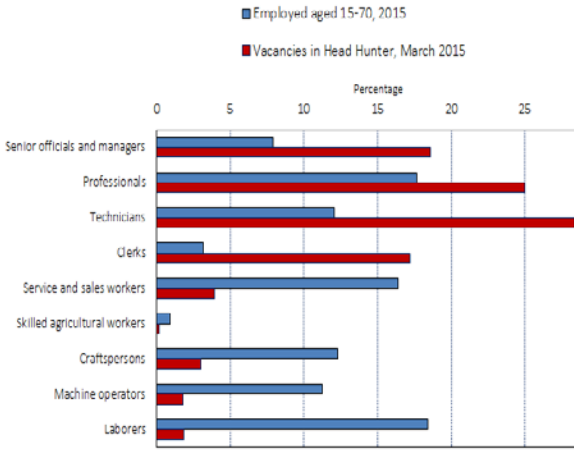
[9] Some statistics suggest that the use of online job websites by firms may not be widespread. The World Bank's 2014 STEP Employer Survey shows that surveyed firms in the sectors of agriculture, food processing, information technology, and renewable energy in Ukraine report using private employment services to hire workers with highest skills gaps by 4, 4, 17, and 29 percent, respectively. By comparison, these four sectors use public employment services by 47, 45, 18, and 53, respectively. 61, 55, 68, and 70 percent, respectively, tell they also informal channels for hires (e.g. personal contacts and recommendations).

[10] It is expected though that the distribution of actual employment and demand for workers (expressed by a job vacancy) across occupations and sectors would differ to some extent. Employment represents a match between firms demanding workers and workers demanding jobs but the whole demand of firms might not be fully satisfied, if firms cannot find adequate workers or no workers at all for instance. Job vacancies may also represent new demand in the labor market that is not translated into employment yet.

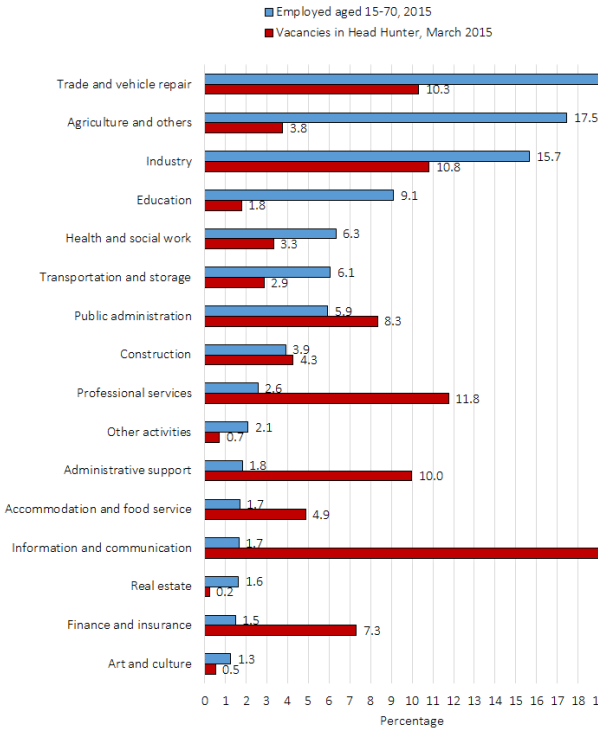
the sectors of information and communication, professional services, and industry, compared to the Ukrainian employment structure (figure 1, panel B). When compared to Trud, the public website of the State Employment Service, jobs advertised in HeadHunter are of higher-skilled occupations and better-paid jobs on average, typically requiring higher levels of education, and from different sectors than Trud, (see appendix B for a comparison of jobs advertised in HeadHunter's and Trud's vacancies).

Figure 3.2.1. Comparing job vacancies in HeadHunter with the structure of employment, 2015

A. Employment in Ukraine versus vacancies in HeadHunter, by broad occupation category



B. Employment in Ukraine versus vacancies in HeadHunter, by sector



Source: Ukraine's State Statistics Service (2016) for employment and HeadHunter data set (2015).

Note: In panel A, occupations are 1-digit occupations according the ISCO-88 classification. In panel B, sectors are classified according to the revision 2 of the Statistical Classification of Economic Activities in the European Community, (NACE).

Hence, job vacancies in HeadHunter are a valuable source of information for the occupations and skills that need attention in workforce development and that employers may find difficulty getting through other websites or traditional means. Given that vacancies in HeadHunter are of higher qualified and better paid occupations, it is desirable to understand the skills associated with those occupations. Plus, the fact that firms used HeadHunter for these vacancies may precisely indicate that they have difficulty filling them using informal means, such as their networks. Thus, these are skills that need policymakers' focus.

3.3. Content of job postings

Virtually all postings feature a job title, the job category (occupation or sector category), the date of posting, the employment type (e.g. full time or temporary), and the job description as a block of text. The postings, collected though web scraping, came as a spreadsheet file with a cell for each of these categories, for every posting. More detailed ones have extra cells featuring some of the following elements: the firm that advertised the job (3 vacancies in 10), required experience (3 in 4), and salary level (1 in 2).

For this study, the team re-classified the content of the sampled job postings into variables of interest, in particular skills. The block of text of job descriptions in the collected postings included a range of information on job requirements and responsibilities. Under this format — a condensed text block — one can observe the requirements and responsibilities for one job vacancy but cannot assess their frequency for occupation categories or the whole sample. Therefore, the team selected a subsample of 2,565 vacancies from the total 7,500 collected to make a first classification of the information from the job description into variables with smaller blocks of text describing categories of requirements (such as a range of skills, minimum education level, field of studies, other) and working conditions. The team then extracted pieces of text or single words referring to requirements to code them into variables allowing quantitative analyses.

3.4. Definition and categories of skills

Skills are attitudes and behaviors that are malleable across an individual's development and, thus, can be learned. In the context of skills listed in job descriptions, the term refers to the attributes defining the ability to handle a range of tasks or situations. Skills are formed not only in school but also by an individual's family, his living environment, extracurricular activities, and the workplace.[11]

Skills can be categorized into three broad overlapping sets (figure 2; Appendix C provides the definition of specific skills in each of the three categories):

- **Cognitive skills** are mental abilities. They include basic academic knowledge, such as literacy and numeracy, and advanced cognitive skills, such as critical thinking and problem-solving. We identified fourteen broad categories of cognitive skills from those that appear in the postings, mostly advanced cognitive skills.[12]
- **Socioemotional skills** are attitudes and behaviors that enable individuals to manage personal and social situations effectively. We categorized socioemotional skills according to two classifications: The Big Five Personality Traits taxonomy, a classification of broad traits widely used in international studies, and the PRACTICE taxonomy, a classification of socioemotional skills for the labor market identified in skills-development interventions and employers' surveys.[13,14]

[11] Green and others (2001); Heckman and Mosso (2014).

[12] Out of the fourteen broad cognitive skills, only literacy and math are basic cognitive skills. The twelve others are advanced cognitive skills.

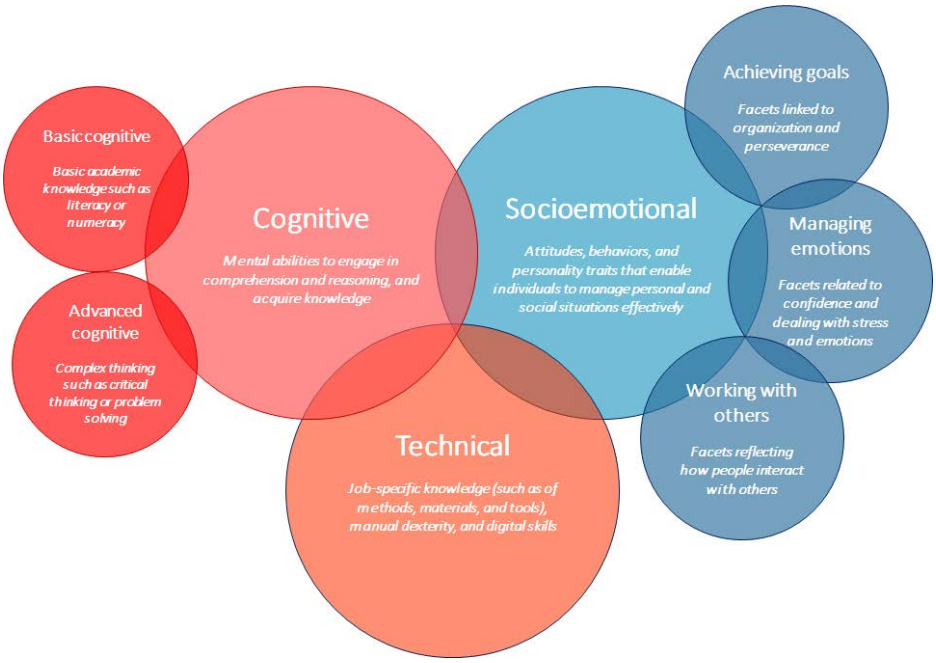
[13] For details on the Big Five personality traits taxonomy see John and Srivastava (1999). For details on the PRACTICE taxonomy of socioemotional skills for the labor market, see Guerra, Modecki, and Cunningham (2014).

[14] Similar studies on other countries usually only distinguish cognitive and socioemotional skills or use their own taxonomy. Beblavý, Kureková, and Haita (2016) and Beblavý and others (2016) split socioemotional skills into two categories, social and personal skills, in studies on Slovakia and the United States, respectively. Kureková and others (2016) use the Big Five Personality Traits taxonomy.

- **Technical skills** are the specific knowledge needed to carry out one's job, e.g. knowledge of production and processing, and knowledge of markets. Technical skills also include technology: digital skills, including the ability to use computer tools.

Basic cognitive skills and socioemotional skills are general skills that serve as a prerequisite to learn more advanced skills, such as advanced cognitive skills and technical skills.

Figure 3.4.1. Framework for cognitive, socioemotional, and technical skills



Sources: Adapted from Cunningham, Acosta, and Muller (2016), based on Borghans and others (2008); Roberts (2009); Almlund and others (2011); OECD (2015).

4. Main findings

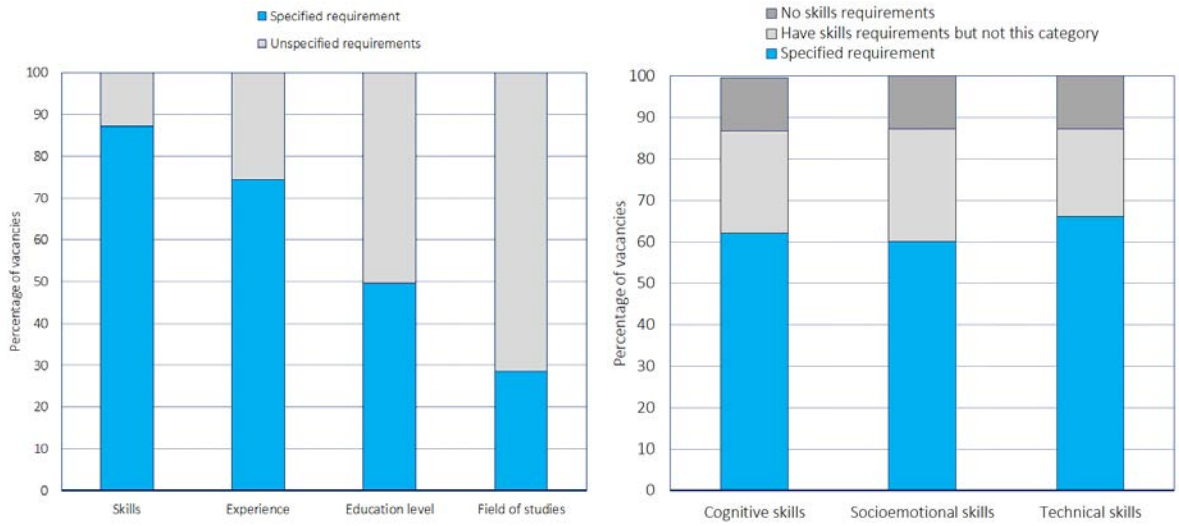
4.1. Virtually all employers list skills requirements while education requirements are much less frequent

Skills are the most frequent requirement in HeadHunter's job vacancies, ahead of work experience and education level. Overall, 9 in 10 job vacancies demand at least one skill, be it a cognitive, socioemotional, or technical skill, or a combination of the three (figure 3, panel A). Most vacancies also request work experience: about 7 in 10. More strikingly, only half of the job vacancies mention needing a minimum education level and less than a third a field of study. One possible explanation for this lack of demand for education — and the simultaneous high demand for skills and work experience — is that most Ukrainians complete higher education, which make it difficult for employers to discern how job applicants may be better at a job based on their education level. Another possible explanation is that higher education in Ukraine is not always of good quality nor relevant for the current labor market.[15] As a result, employers do not rely on diplomas to judge the abilities of a future employee but rather of what he can do — his skills — and what he has done — his work experience.

[15] Del Carpio, Kupets, and Muller (2017).

Figure 4.1.1. Job requirements

A. All requirements *B. Skills requirements*



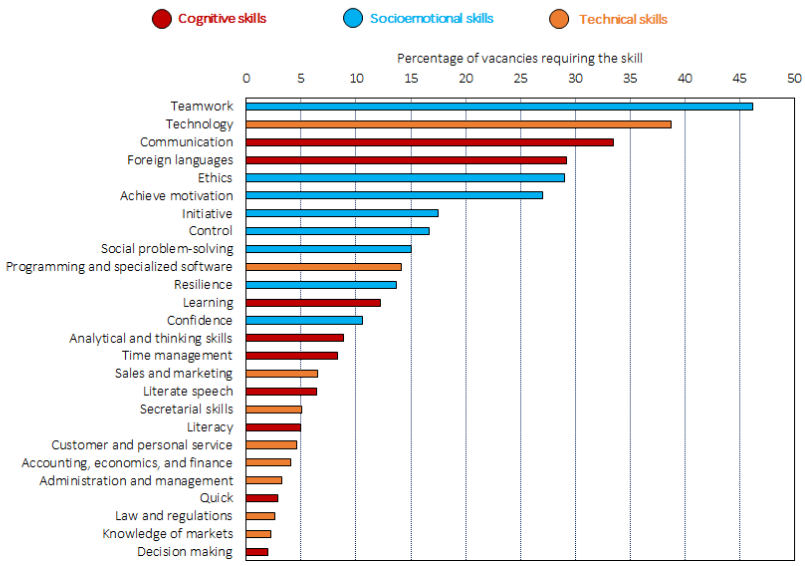
Source: Job vacancies on HeadHunter online website, March 2015.

Note: The sample includes 2,565 job vacancies.

Employers seek a combination of advanced cognitive, socioemotional, and technical skill sets. Cognitive, socioemotional, and technical skills are each demanded by more than 6 in 10 job vacancies (figure 3, panel B). 6 skills are demanded by more than a quarter of vacancies: teamwork (a socioemotional skill; 46 percent), technology (a technical skill; 39 percent), communication (a cognitive skill; 34 percent), foreign languages (a cognitive skill; 29 percent), ethics (a socioemotional skill; 29 percent), and achievement motivation (a socioemotional skill; 27 percent) (figure 4).[16]

[16] See appendix C for definitions of the skills.

Figure 4.1.2. Most-demanded cognitive, socioemotional, and technical skills



Source: Job vacancies on HeadHunter online website, March 2015.

Notes: 15 categories of cognitive skills, 8 categories of socioemotional skills (using the PRACTICE taxonomy), and 21 categories of technical skills are considered. Skills appearing in less than 2 percent of vacancies are omitted from the graph for ease of presentation. See appendix C for definition of skills categories. The sample includes 2,565 job vacancies, including those not mentioning any required skill at all.

Most demanded skills in the job vacancies are consistent with results from employer surveys when considering broad skills categories but differ when considering specific skills. A 2014 survey of employers in Ukraine of four sectors — agriculture, food processing, information technology, and renewable energy — also ranked a mix of cognitive, socioemotional, and technical skills among top-5 skills.[17] The survey asks employers to rank the five most important skills for their new hires among a list of fourteen.[18] Technical skills,

[17] Del Carpio, Kupets, and Muller (2017).

[18] The fourteen skills were: literacy in the official language, literacy in English, literacy in another foreign language, numeracy, job-specific technical skills, communication, leadership, teamwork, creative and critical

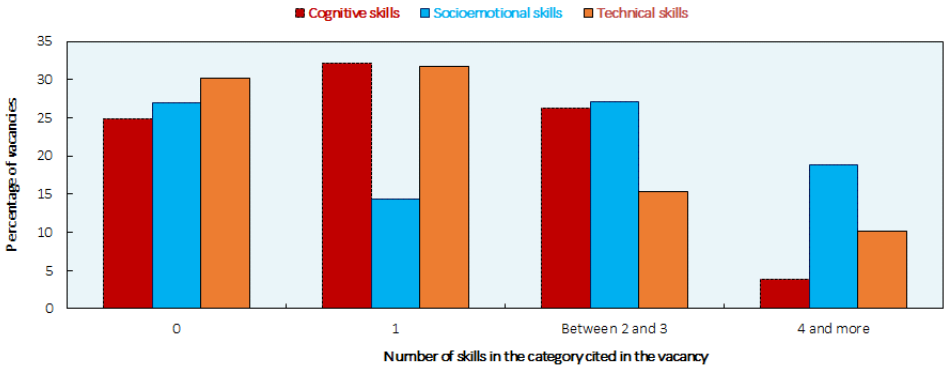
featured as a single option in the survey, turned out to be the most important in all the four sectors. Two cognitive skills (problem solving, creative and critical thinking) and three socioemotional skills (professional behavior, ability to work independently, and teamwork) were among the second to the fifth most important skills, changing only marginally the order across sectors. Job vacancies and the 2014 survey have in common a high demand for similar socioemotional skills: teamwork, ethics (which has overlap with "professional behavior"), and achievement motivation (which has some overlap with "the ability to work independently", picked in the 2014 survey). However, they have discrepancies: (i) the job vacancies allow to show the demand for disaggregated technical skills, such as handling technology; (ii) cognitive skills appearing more demanded in the HeadHunter vacancies are about communication and foreign languages while those in the 2014 survey are about creative and critical thinking and problem solving. The differences may come from their different samples (the survey focuses on four sectors; the vacancies have higher-skilled occupations and more IT and professional services than the structure of employment in the country), but may also due to the fact that the survey asks employers about an ad-hoc list with different skills categories.

4.2. A wide range of socioemotional skills are in demand for all occupations

Employers demand a wider range of socioemotional skills than cognitive and technical skills. 46 percent of all vacancies — including vacancies with no skills requirements — demand two or more socioemotional skills while only 15 percent demand one (figure 5). Some occupations, such as business-service agents and trade brokers, even require five socioemotional skills on average and a small number of vacancies require up to thirteen socioemotional skills, reflecting the multiplicity of this skills set. By contrast, most vacancies demand only one cognitive skill (32 percent). While vacancies demanding technical skills can demand up to nineteen technical skills (many software programs for computer professionals, for example), most vacancies demand only one technical skill too (32 percent).

thinking, problem solving, independence, environmental awareness, professional behavior, and time management.

Figure 4.2.1. Number of citations of a skills category



Source: Job vacancies on HeadHunter online website, March 2015.

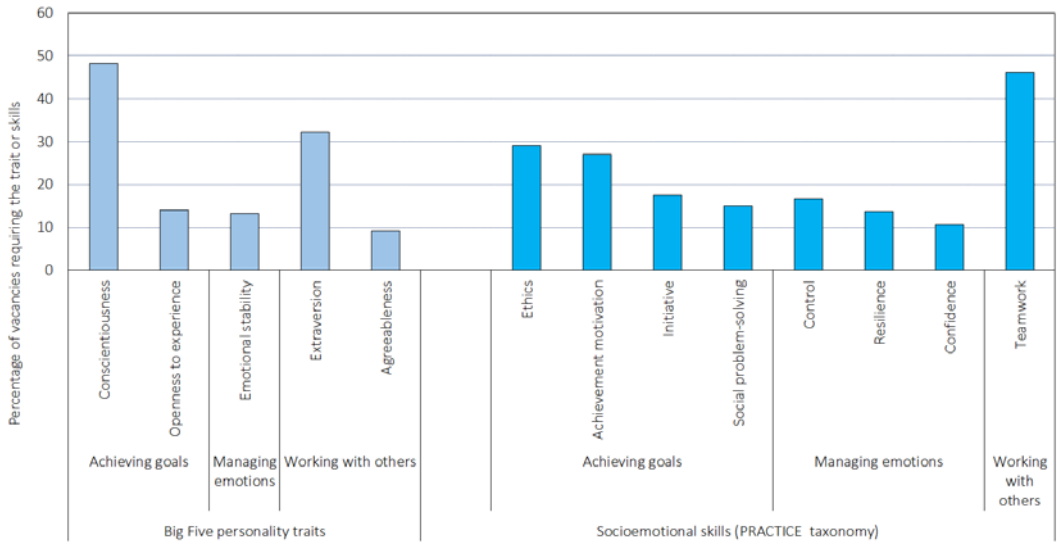
Note: The sample includes 2,565 job vacancies, including those not mentioning any required skill at all.

Each socioemotional skill is demanded in at least 10 percent of the vacancies. Regardless of the classification of socioemotional skills considered – the Big Five Personality Traits taxonomy or the PRACTICE taxonomy – there is demand for each socioemotional skill in at least 10 percent of the vacancies (figure 6). In the Big Five taxonomy, conscientiousness is the skill in highest demand, followed by extraversion.[19] In the PRACTICE taxonomy, socioemotional skills in highest demand are related to working with others (teamwork) and achieving goals (which partly corresponds to being conscientious, but also taking initiative, and solving social problems, and having ethics).[20]

[19] Conscientiousness is most often the strongest predictor of labor-market outcomes, partly because this personality trait is useful across a wide range of work-related tasks (Nyhus and Pons 2005; Almlund and others 2011).

[20] Having results for two taxonomies of socioemotional skills brings to light that the measured demand for specific skills categories is somehow sensitive to the classification of skills. We observe slightly different results of most-demanded socioemotional skills when using the Big Five Personality Traits taxonomy and using the PRACTICE taxonomy. The most-demanded personality traits in the Big-Five taxonomy, conscientiousness and extraversion, have some but incomplete overlap with most-demanded skills with the PRACTICE taxonomy that are teamwork, ethics, and achievement motivation (see Table C.2 for a comparison of the Big Five and PRACTICE

Figure 4.2.2. Demand for Big Five Personality Traits and PRACTICE taxonomies



Source: Job vacancies on HeadHunter online website, March 2015.

Note: The sample includes 2,565 job vacancies, including those not mentioning any required skill at all.

The demand for specific socioemotional skills is relatively similar across occupations, with some socioemotional skills in high demand across widely diverse occupations. Across the top-16 occupations, the demand for specific socioemotional skills is relatively close to the average — the three main required skills being teamwork, ethics, and achievement motivation (figure 7, panel A).[21] A few other skills stand out as important for a variety of job contexts. Confidence, for instance, is in highest demand for business services agents and trade brokers, which is expected given that they need to build trust with other clients or other trade brokers (figure 7, panel B). The second occupation where confidence is in highest demand is hairdressers and barbers, an occupation of lower qualifications but that requires gaining trust from clients and possibly convincing them to try new styles. The third occupation

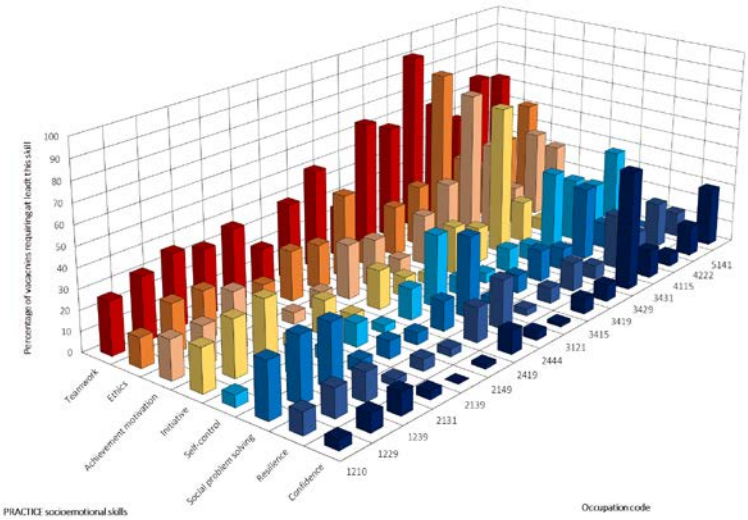
taxonomies). The percentages and rankings of detailed cognitive, socioemotional, and technical skills depend to some extent on the classification of specific skills into these categories.

[21] The top-16 occupations are those with at least 30 vacancies in the data set (see the detailed list in appendix D).

demanding confidence most is receptionists and information clerks, another low-qualification occupation but that also needs confidence in addressing a diverse set of demands. Similarly, resilience is in demand from — in order of frequency — translators, secretaries, and receptionists. While the latter two have very different qualification levels from the former, it is not surprising to see that translators need to be resilient, given that their work can be very intense on a short period. Similarly, secretaries and receptionists may also have to deal with multiple demands and difficult people.

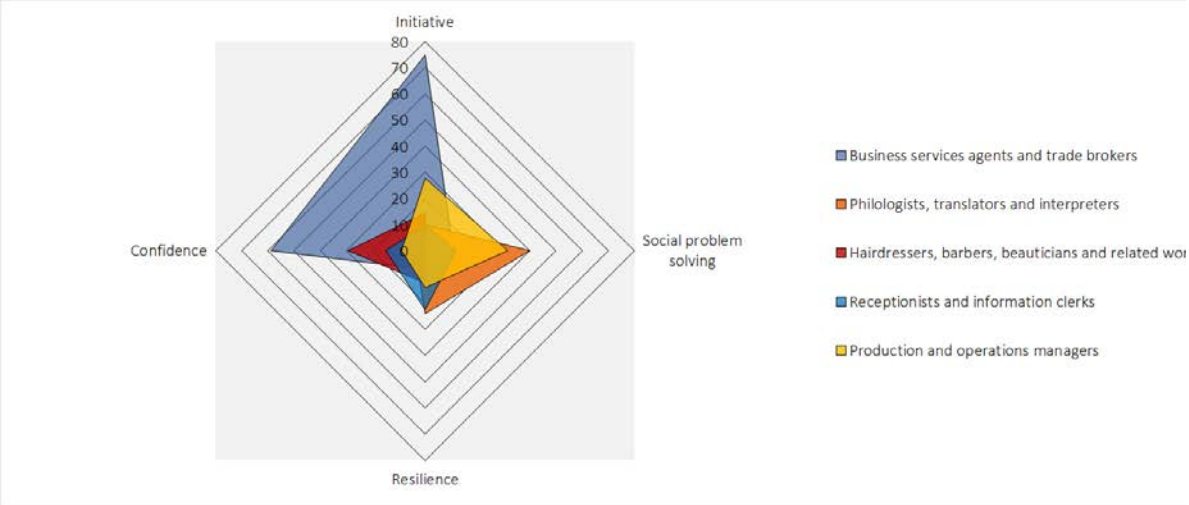
Figure 4.2.3. Demand for specific socioemotional skills across occupations

A. Demand for detailed socioemotional skills by top-16 occupations



Occup. code	Occupation name
	Senior officials and managers
1210	Directors and chief executives
1229	Production and operations managers (diverse)
1239	Specialist managers (diverse)
	Professionals
2131	Computer systems designers, analysts, and programmers
2139	Computing professionals (diverse)
2149	Architects, engineers and related professionals (diverse)
2419	Business professionals (diverse)
2444	Philologists, translators and interpreters
	Technicians
3121	Computer assistants
3415	Technical and commercial sales representatives
3419	Finance and sales associate professionals (diverse)
3429	Business services agents and trade brokers (diverse)
3431	Administrative secretaries and related associate professionals
	Clerks
4115	Secretaries
4222	Receptionists and information clerks
	Services and sales workers
5141	Hairdressers, barbers, beauticians and related workers

B. Demand for selected specific socioemotional skills for selected occupations (percentage of vacancies requiring the skills)



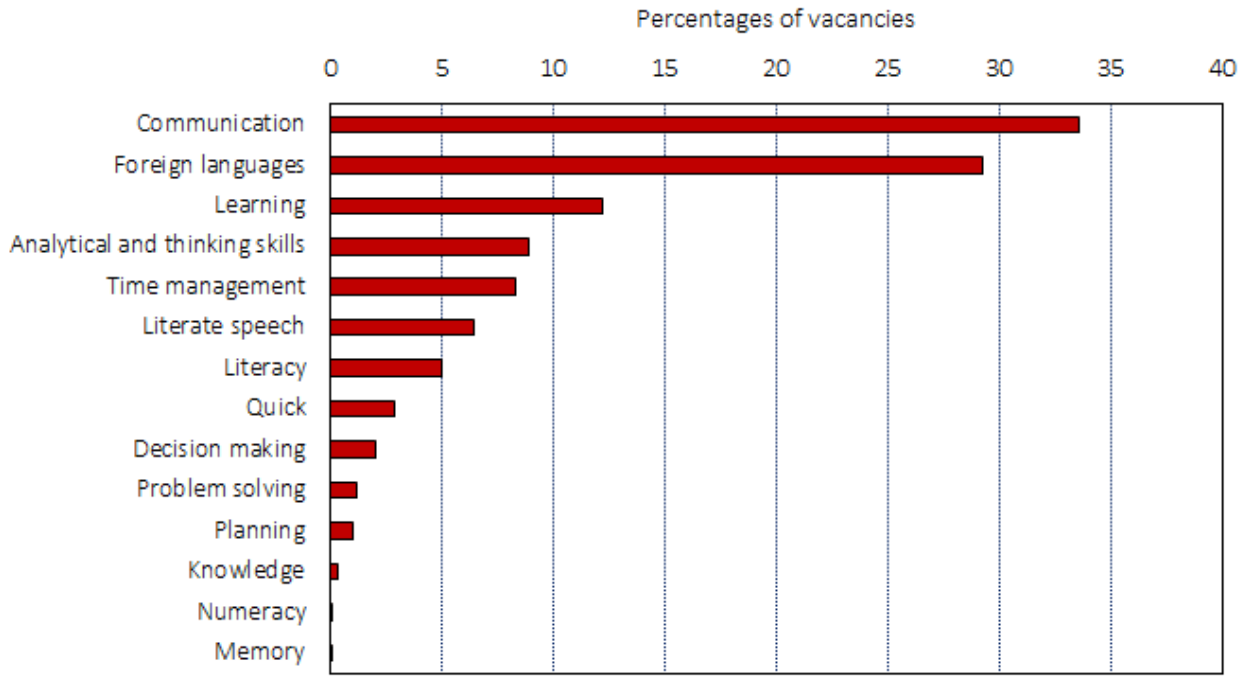
Source: Job vacancies on HeadHunter online website, March 2015.

Notes: Socioemotional skills are classified according to the PRACTICE taxonomy (Guerra, Modecki, and Cunningham 2014). Numbers in labels are occupation codes of the 4-digit classification ISCO-88. The sample includes the 1,779 vacancies of the top-16 occupations with most vacancies (more than 30 each), which represent 69 percent of the 2,565 job vacancies of the total sample.

4.3. Cognitive skills requirements focus on communication, foreign languages, and other cognitive skills that are demanded differently across occupations

Communication and foreign languages stand out among cognitive skills cited in the job vacancies. The requirements of cognitive skills focus on fewer items than those of socioemotional skills, of which communication and foreign languages have the lion's share. Communication, the ability to effectively convey information to others orally and in writing, is an explicit requirement for a third of vacancies (34 percent) (figure 8). As many jobs must deal with foreign firms for trade, supply chains, or services, close to a third of vacancies also require the ability to speak and write in a foreign language (29 percent). This is far more than the following cognitive skills most in demand: learning (12 percent), time management (8 percent), analytical and thinking skills (8 percent).

Figure 4.3.1. Specific cognitive-skills requirements of all vacancies

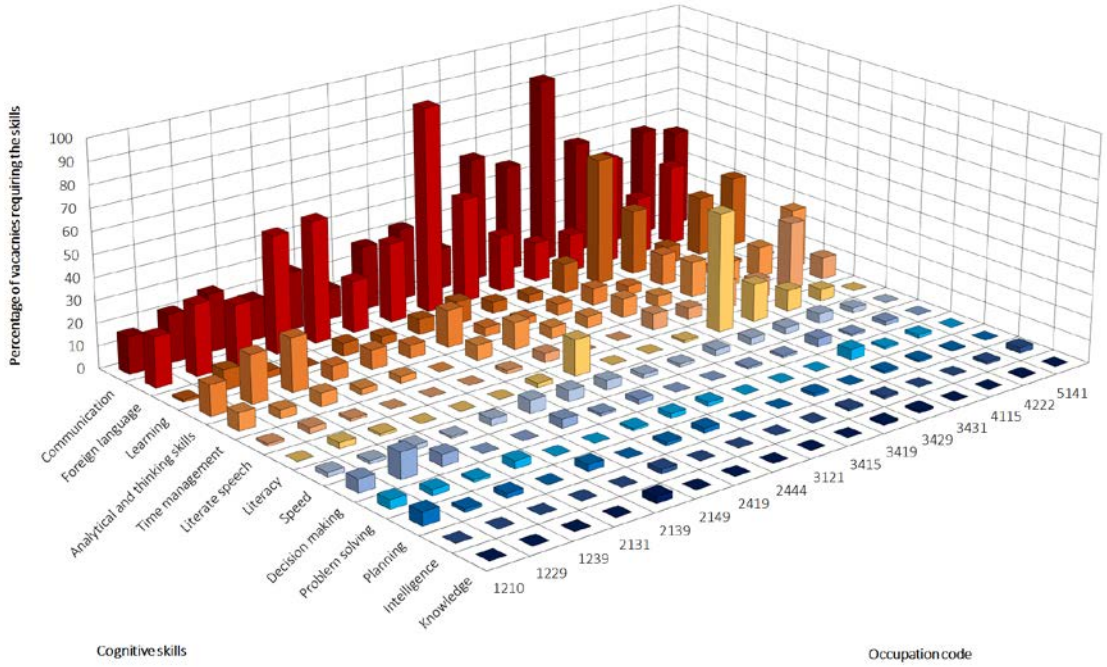


Source: Job vacancies on HeadHunter online website, March 2015.

Notes: See appendix C for definition of skills categories. The considered job vacancies are 2,565 and includes those not mentioning any required skill at all.

Beyond communication and foreign languages, demand for other cognitive skills varies greatly across occupations. The demand for communication and foreign languages is generally the same across occupations (figure 9, panel A). There are exceptions for those dealing with local services who need less foreign languages (hairdressers for instance) and professionals who need more of it (programmers can hardly work without some command of English since coding uses it, for instance). Other cognitive skills matter greatly for some occupations, such as learning and literacy for business services agents and trade brokers, and analytical and thinking skills for managers, learning and time management for hairdressers and the like (figure 9, panel B).

Figure 4.3.2. Demand for detailed cognitive skills by top-16 occupations



Occup. code	Occupation name
	Senior officials and managers
1210	Directors and chief executives
1229	Production and operations managers (diverse)
1239	Specialist managers (diverse)
	Professionals
2131	Computer systems designers, analysts, and programmers
2139	Computing professionals (diverse)
2149	Architects, engineers and related professionals (diverse)
2419	Business professionals (diverse)
2444	Philologists, translators and interpreters
	Technicians
3121	Computer assistants
3415	Technical and commercial sales representatives
3419	Finance and sales associate professionals (diverse)
3429	Business services agents and trade brokers (diverse)
3431	Administrative secretaries and related associate professionals
	Clerks
4115	Secretaries
4222	Receptionists and information clerks
	Services and sales workers
5141	Hairdressers, barbers, beauticians and related workers

Source: Job vacancies on HeadHunter online website, March 2015.

Notes: Numbers in labels are occupation codes of the 4-digit classification ISCO-88. The sample includes the 1,779 vacancies of the top-16 occupations with most vacancies (more than 30 each), which represent 69 percent of the 2,565 job vacancies of the total sample.

4.4. In a given occupation, cognitive and socioemotional skills appear as complementary: they are demanded similarly

A given occupation needs cognitive and socioemotional skills at the same frequency. This is the case of 12 top-demanded occupations out of the 16 that we have analyzed in detail. Job vacancies of business-service agents and trade brokers show the highest demand for both cognitive and socioemotional skills (close to 100 percent), while vacancies of directors and chief executives and architects and engineers have the lowest (less than 40 percent) (figure 10).[22] The bulk of occupations have high frequencies of joint requirements for these two skills, which range between 50 and 90 percent. High-skilled occupations — senior officials and managers, professional, and technicians — tend to have lower requirements for these two skills than medium-skilled occupations — clerks and service and sales workers. The high demand for both cognitive and socioemotional skills across occupation skill-level is consistent with other employer surveys from around the world and similar skills-demand analysis on job vacancies in Slovakia and the United States.[23] One interpretation for this finding is that cognitive and socioemotional skills are complementary and form a base needed to apply the technical skills require for a given occupation.

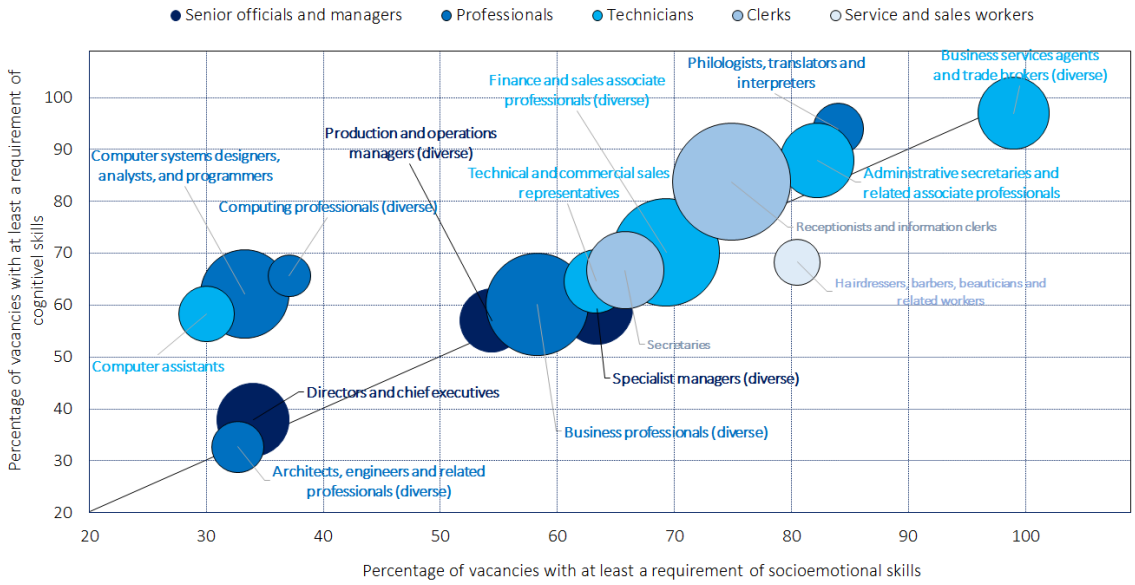
There are a few exceptions. Given that their job might require less interactions with others than other occupations, professionals and technicians working with computers demand

[22] One would expect higher skills requirements for directors and chief executives, since they have more work responsibilities than regular employees. One potential explanation for the low level of requirements in job vacancies is that firms may have a different recruitment process for these occupations, with just a handful of high-level applicants to manage, and may rely more on interviews, references, and reputation than job vacancies to fill their positions. As such, they would less frequently advertise detailed job vacancies for these positions.

[23] Cunningham and Villaseñor (2016); Kureková, Beblavý and Haita (2012, 2016). Kureková and others (2016).

cognitive skills twice as often as socioemotional skills (around 60 percent versus around 30 percent). Beauticians and related professions, by contrast, demand socioemotional skills more frequently than cognitive skills (80 percent versus 68 percent).

Figure 4.4.1. Joint demand for cognitive and socioemotional skills



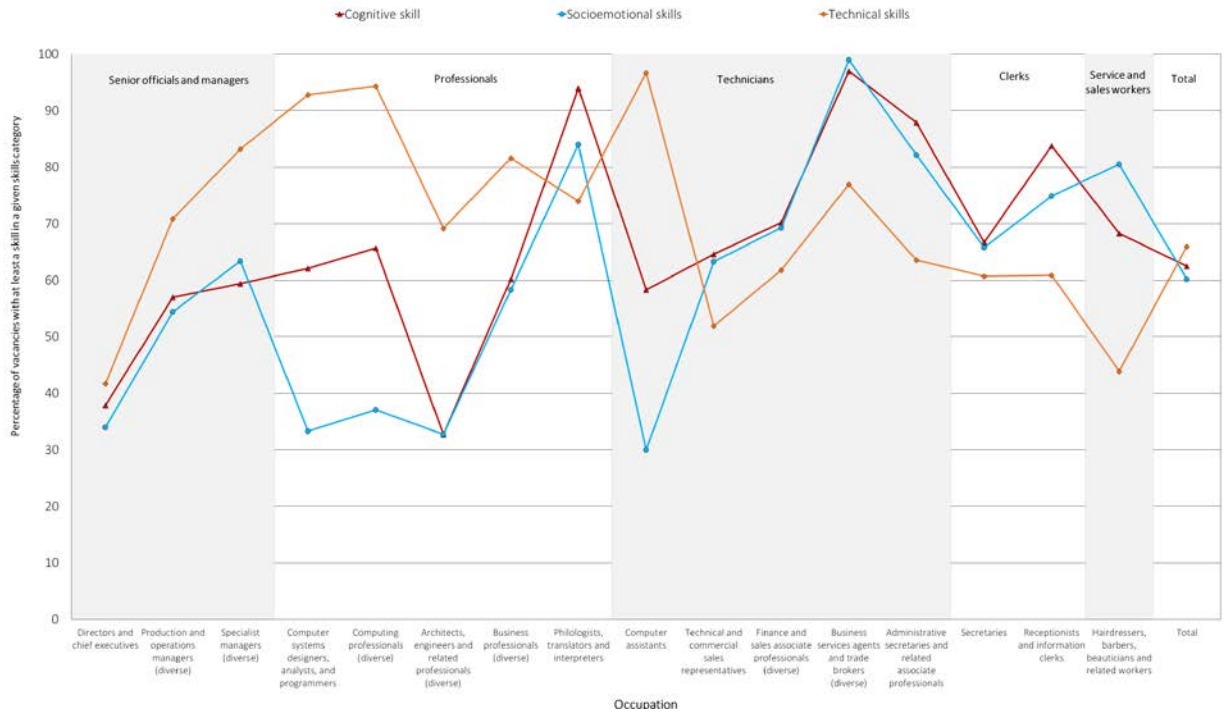
Source: Job vacancies on HeadHunter online website, March 2015.

Note: the size of the bubbles represents the number of vacancies of an occupation in the data set, ranging from 35 to 271. The line plots benchmark points for which the percentage of vacancies requiring cognitive or socioemotional skills would be the same. The sample includes the 1,779 vacancies of the top-16 occupations with most vacancies (more than 30 each), which represent 69 percent of the 2,565 job vacancies of the total sample.

4.5. Requirements for technical skills vary across occupations but most occupations demand some information and technology skills

Technical skills are in highest demand among high-skilled occupations, and more so than cognitive and socioemotional skills. Technical skills, on one hand, and cognitive and socioemotional skills, on the other hand, seem to be inversely correlated: higher-skilled occupations tend to need more often technical skills and less often cognitive and socioemotional skills than medium-skilled occupations, and vice versa. The frequency of the demand for technical skills is most often much higher for higher-skilled technical occupations (such as production and operations managers and specialist managers, occupations working heavily with computers, and architects and engineers) and lower for lower-skilled occupations (technicians, clerks, and service workers) (figure 11).

Figure 4.5.1. Demand for broad categories of cognitive, socioemotional, and technical skills, by top-16 occupations (from higher-skilled to lower-skilled)



Source: Job vacancies on HeadHunter online website, March 2015.

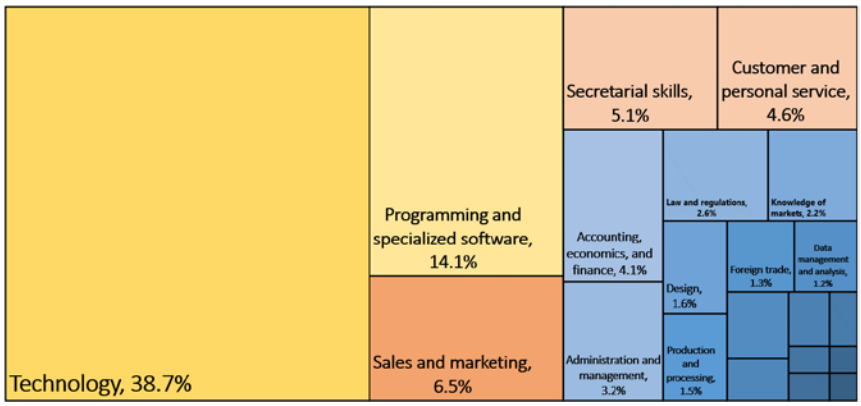
Note: Numbers in labels are 4-digit occupation codes (ISCO-88). See appendix D for correspondence to the occupation description. The sample includes job vacancies for each of the top-16 occupations with most vacancies (more than 30 each, summing to 1,779 vacancies). The total includes the 2,565 job vacancies of the total sample.

Even within lower-skilled occupations, most technical skills requirements are about IT skills. Ukraine is the largest supplier of information technology (IT) specialists of Eastern Europe and one of the top 10 countries in the world.[24] Yet, technical-skills requirements are not restricted to IT specialist. Handling technology, the most cited technical skill, is cited in nearly 40 percent of vacancies. Handling technology refers to knowing how to use computer software (for graphic design or architecture for instance), computers' operating systems (e.g. Linux, Windows), and internet processes such as Search Engine Optimization (the process of affecting the online visibility of a website or a web page in a web-search engine), among others. The second most-demanded technical skill is computer programming (demanded by 15 percent of vacancies), which are more advanced IT skills to develop instructions to apply specific tasks on a computer. The demand for other skills is highly diverse: The nineteen other technical skills are at most 6 times less demanded than technology skills (figure 12). The sum of the share of vacancies requiring these nineteen other skills equals the demand for technology skills.

[24] Kelly and others (2017).

Figure 4.5.2. Technical skills requirements of selected occupations

Percentage of vacancies among all vacancies mentioning a given skill in their requirements

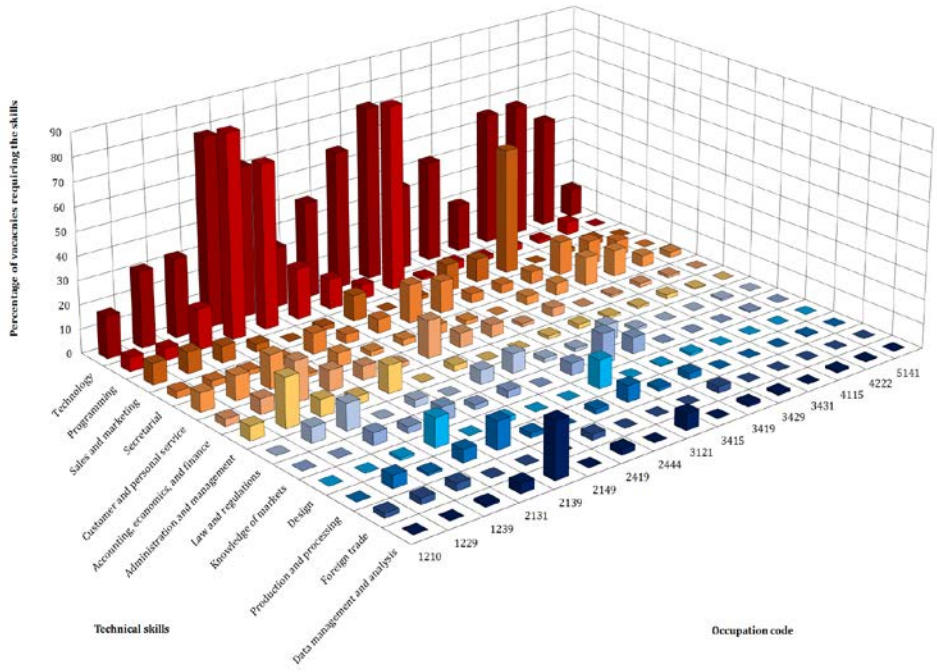


Source: Job vacancies on HeadHunter online website, March 2015.

Notes: Squares without labels are requirements with less than one percent of job vacancies. They include cosmetology, math, medical knowledge, knowledge of places, personnel and human resources, fine arts, and fitness. The sample includes 2,565 job vacancies, including those not mentioning any required skill at all.

Other technical skills vary greatly across occupations. There is much more heterogeneity across occupations in the demand for technical skills than in the demand for cognitive and socioemotional skills. Aside from technology, for which demand is high across the board, most occupations only share a subset of technical skills requirements. Directors and chief executives, for instance, need sales and marketing (as do commercial sales representatives), customer and personal service (as do secretaries), and administration and management (as do production and operation managers), but no other occupation require the same set of technical skills (figure 13). Some technical skills are even demanded by one occupation only: cosmetology for hairdressers and data management and analysis for computing professionals, for example. These results point out the benefits of this analysis: Not using a pre-defined list of skills and allowing identifying specific skills in demand, even among technical skills.

Figure 13. Demand for detailed technical skills by top-16 occupations



Occup. code	Occupation name
	Senior officials and managers
1210	Directors and chief executives
1229	Production and operations managers (diverse)
1239	Specialist managers (diverse)
	Professionals
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2139	Computing professionals (diverse)
2149	Architects, engineers and related professionals (diverse)
2419	Business professionals (diverse)
2444	Philologists, translators and interpreters
	Technicians
3121	Computer assistants
3415	Technical and commercial sales representatives
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3429	Business services agents and trade brokers (diverse)
3431	Administrative secretaries and related associate professionals
	Clerks
4115	Secretaries
4222	Receptionists and information clerks
	Services and sales workers
5141	Hairdressers, barbers, beauticians and related workers

Source: Job vacancies on HeadHunter online website, March 2015.

Notes: Numbers in labels are 4-digit occupation codes (ISCO-88). The sample includes the 1,779 vacancies of the top-16 occupations with most vacancies (more than 30 each), which represent 69 percent of the 2,565 job vacancies of the total sample.

5. Conclusion

The observed demand from actual job vacancies confirms that employers look for skills rather than for diplomas for their employees, and this holds true across diverse occupations. At least 60 percent of vacancies in HeadHunter demand the three broad skills categories of cognitive, socioemotional, and technical – and 90 percent at least one of them. By contrast, only half the vacancies include education requirements. This could well presage of an era where jobseekers would have to be more and more explicit about their skills when applying to jobs — in their CVs, for example — as opposed to putting upfront their education and work experience as they do now.

The analysis shows the centrality of socioemotional skills: employers look for a wide range of socioemotional skills across many occupations, more so than for cognitive and technical skills. Most demanded socioemotional skills are related to working with others, being conscientious, taking initiative, and having ethics, but ads mention the entire range of socioemotional skills, including achievement motivation and control. This wide range of socioemotional skills is required for all occupations, including occupations with lower qualifications. Cognitive requirements focus on a smaller number of skills, which include communication and foreign languages. Similarly, most occupations' demand for technical skills focus on information and technology skills and vary greatly across occupations for other technical skills.

Cognitive and socioemotional skills appear as complementary: they are demanded similarly when considering a given occupation. Cognitive and socioemotional skills seem to form a

base needed to apply the technical skills required for a given occupation. Both types of skills are especially demanded among lower-skilled occupations.

Job vacancy data, such as those analyzed in this paper, provide new insights usually unavailable in traditional instruments to measure employers' demand for skills and labor. First, they give detailed information on skills, especially technical ones, without imposing a pre-defined list of options. Second, job vacancies show actual demand from employers rather than intentions captured in surveys. Overall, while job vacancies from HeadHunter are only a subset of all vacancies in the country, they cover desirable high- and medium-skilled occupations. When comparing findings of most demanded skills in HeadHunter and in the 2014 Ukraine STEP Employer survey, there are some similarities (a mix of cognitive, socioemotional, and technical skills; similar socioemotional skills) but also differences (different cognitive and technical skills). This suggests that job vacancies are a promising way to identify skills in demand, in complement to surveys. Job vacancies can be used by governments and researchers to continuously assess labor market information, including to capture skills demand among emerging occupations, and address information failure. This could considerably enhance career-guidance provided to students and jobseekers.

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Appendix A. Web scraping of job vacancies

Web scraping (an online data-collection technique) and online job websites

In March-April 2015, a World Bank team used web scraping, a technique to extract data from websites, to capture online job vacancies that had been posted for a few months on two job websites: HeadHunter, a popular private website, and Trud, the public website run by the State Employment Service.[25] A study of job websites of eleven European countries uses a similar method to extract occupations' requirements from vacancies.[26]

The analysis focuses on HeadHunter because it provides information on skills requirements for most of its vacancies. By contrast, Trud provides such information for virtually none of its vacancies. The data set of Trud vacancies serves as comparator to HeadHunter for the types of jobs advertised in the website (see appendix B).

Samples

Sample HeadHunter: On March 24–27, 2015, the team used web scraping to collect 7,486 job vacancies that were posted between February 27 and March 26, 2015. Every vacancy came as a spreadsheet with a few cells including basic information on the vacancy (job title, sectors, location, etc.) and a cell with a block of large text corresponding to the job requirements. The team then selected a subsample of 2,901 vacancies from those collected to make it more manageable to classify the block of texts of job requirements into variables: the team randomly selected 20 percent of job vacancies within the 20 professional areas — the website's job categories mixing occupations and sectors — with the largest number of vacancies and most similar job requirements across vacancies.[27] Duplicates, which were scraped vacancies posted under several professional areas, were dropped, some vacancies

[25] See Carnevale, Jayasundera, and Repnikov (2014) for details on web scraping techniques and challenges.

[26] Beblavý and others (2016).

[27] Among the 28 professional areas, 20 had a random subsampling of their vacancies and 8 were left as such. The latter 8 are: administrative personnel, installation and service, insurance, management, manufacturing, procurement, mining and quarrying, sports clubs (include fitness clubs and beauty salons).

were reclassified in professional areas that corresponded better to their content, resulting in a final sample of 2,565 vacancies (figure A.1.).

Figure A.1. Number of job vacancies in HeadHunter after web scraping and after sampling and data cleaning, by professional area

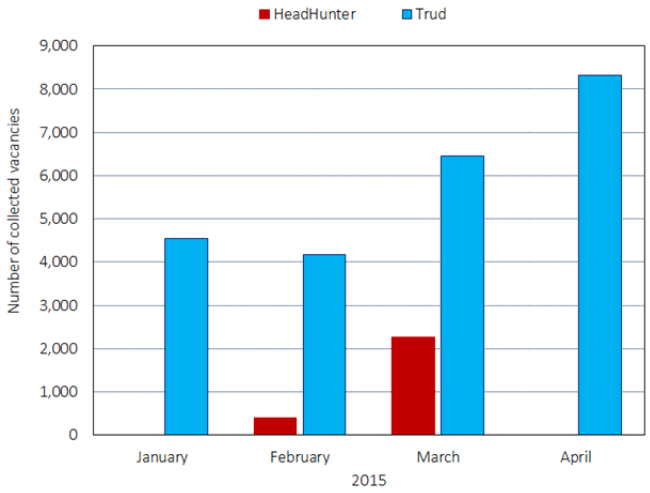
#	Professional areas	Original number of vacancies retrieved by the web scrapping	Final number of vacancies after subsampling and data cleaning
1	Accounting, Management Accounting, Corporate Finance	271	129
2	Administrative Personnel	487	513
3	Art, Entertainment, Media	91	22
4	Automotive Business	72	17
5	Banks, Investments, Finance	280	71
6	Career Starters, Students	601	134
7	Construction, Real Estate	181	37
8	Consulting	42	15
9	Domestic Staff	15	8
10	Government, NGOs	116	8
11	Human Resources, Training	249	59
12	IT, Internet, Telecom	1249	389
13	Installation and Service	56	12
14	Insurance	67	38
15	Lawyers	92	18
16	Maintenance and Operations Personnel	80	15
17	Management	245	144
18	Manufacturing	339	238
19	Marketing, Advertising, PR	882	295
20	Medicine, Pharmaceuticals	220	58
21	Procurement	15	15
22	Raw Materials	12	11
23	Sales	1199	153
24	Science, Education	124	25
25	Security	111	22
26	Sports Clubs, Fitness Clubs, Beauty Salons	71	54
27	Tourism, Hotels, Restaurants	141	29
28	Transport, Logistics	178	36
	Total	7,486	2,565

Source: HeadHunter data set (March 2015).

Note: Professional areas are HeadHunter's own classification of job categories mixing occupations and sectors. The subsampling consisted in randomly selecting 20 percent of a professional area's job vacancies for professional areas with most vacancies and most similar job requirements across vacancies (professional areas number 3, 4, 5, 6, 7, 11, 15, 16, 24, 25, and 28) and the cleaning consisted in dropping duplicated vacancies.

Sample Trud: On April 18–22, 2015, the team used web scraping to collect more than 32,000 vacancies that were posted between October 31, 2008, and April 22, 2015. The team removed all vacancies older than January 1, 2015, which were likely to be obsolete, resulting in a final sample of 23,477 vacancies. Figure A.2. shows the number of vacancies collected for HeadHunter and Trud by month of posting.

Figure A.2. Collected vacancies by website by month of posting



Source: HeadHunter data set (March 2015) and Trud (January-April 2015).

Data cleaning

The data set went through an extensive effort of cleaning and classification of the information collected. Under guidance, research assistants extracted blocks of text and parsed them into variables that could be then coded. For the case of requirements of skills, variables of broad categories of skills – generic skills (cognitive and socioemotional), technical skills, computer skills, foreign language – were extracted from the single variable of the job description. The team used Stata to generate variables with single skills and skill categories to quantify the frequency of such requirements. Not every vacancy included these requirements in the job description, so the process also generated missing values that were then coded into zeros to indicate that a given skill was not demanded by a given occupation. Original information in Russian and Ukrainian was translated into English.

Appendix B. Comparing jobs advertised in HeadHunter and the public online job website, Trug.gov.ua

HeadHunter has the reputation to advertise high-skilled jobs while Trud, the public website managed by the State Employment Service, has the opposite reputation. Even though they are required to, many firms do not even advertise job vacancies in the State Employment Service's website, preferring to do so in private websites, because jobseekers who use the State Employment Service typically have low skills.[28] This appendix reviews and compares the job vacancies scraped from these two websites.[29]

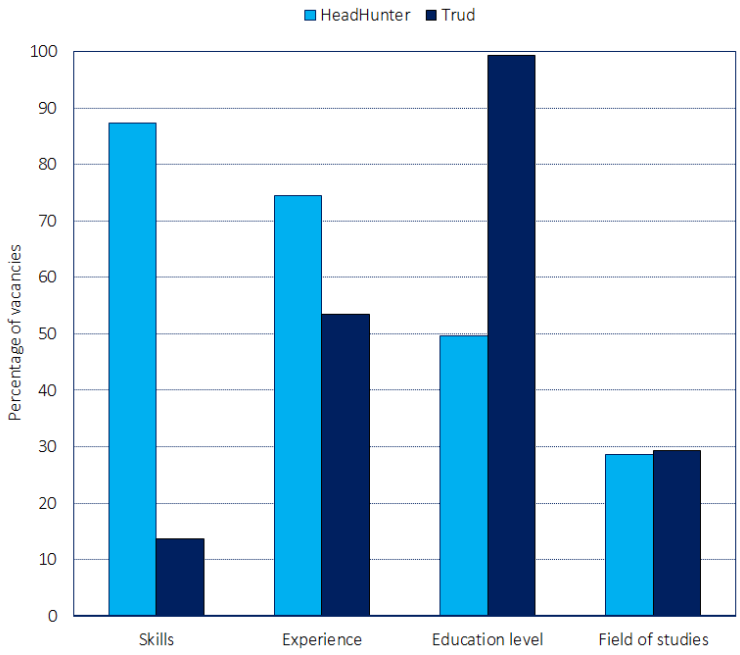
Job requirements: Skills for HeadHunter, Education for Trud

The two websites have opposite skills and education requirements. While virtually every job vacancy in Trud requires a minimum level of education, this is the case for only half of HeadHunter's vacancies (figure C.1). The opposite holds true regarding skills: close to 9 HeadHunter's vacancies out of 10 include skills requirements in their job description, while only 13 percent of Trud's vacancies include them. This contrast might result from (i) employers in HeadHunter look for skills, rather than diplomas of uncertain quality, and choose to be explicit about the skills they need in their vacancies; (ii) the forms filled by employers to post a vacancy in each website incentivize the way the job description is written. Furthermore, work experience is slightly higher for HeadHunter as well (74 percent versus 53 percent for Trud). On the other hand, and field of study is required similarly in the two websites, at around 30 percent.

[28] Kupets (2010).

[29] While the vacancies do not cover the same exact months (HeadHunter essentially March 2015 and Trud January-April 2015) they still cover about the same time-period and we do not expect differences to be driven by seasonality.

Figure B. 1. Requirements in HeadHunter's and Trud's job vacancies

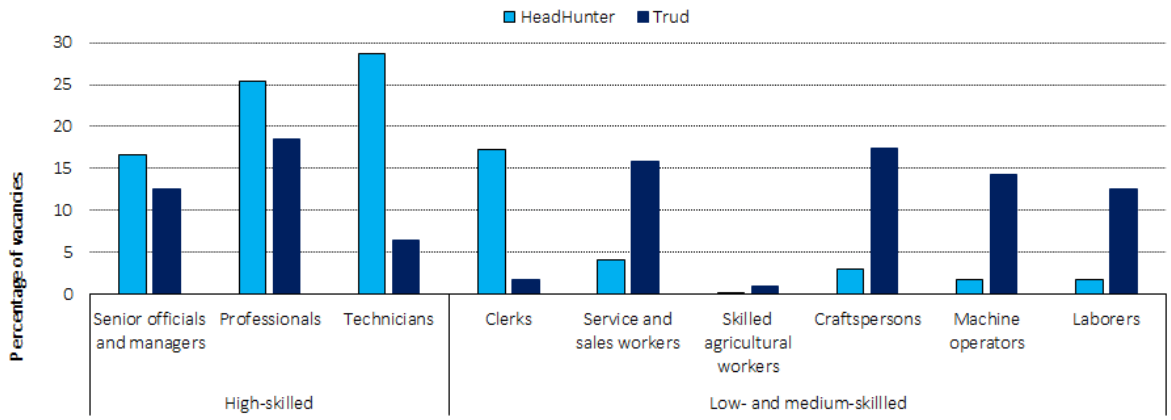


Source: HeadHunter data set (February-March 2015) and Trud (January-April 2015).

Occupations and sectors: HeadHunter's vacancies are of high-skilled occupations and higher valued-added sectors than Trud

Headhunter's vacancies mostly cover high-skilled occupations categories and little low- and medium-skilled occupations while Trud's vacancies distributed relatively heavenly across occupation categories (figure C.2). Similar differences appear when considering sectors (figure C.3).

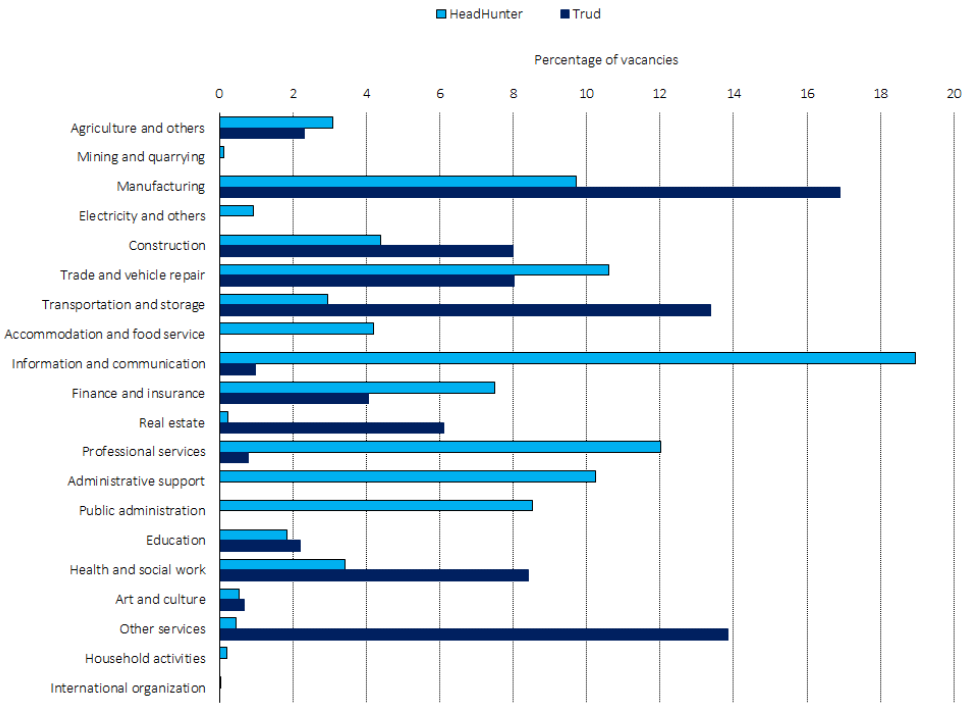
Figure B.2. Vacancies by broad occupation categories



Source: HeadHunter data set (March 2015) and Trud (January-April 2015).

Note: Occupations are 1-digit occupations according the ISCO-88 classification.

Figure B.3. Vacancies by sectors



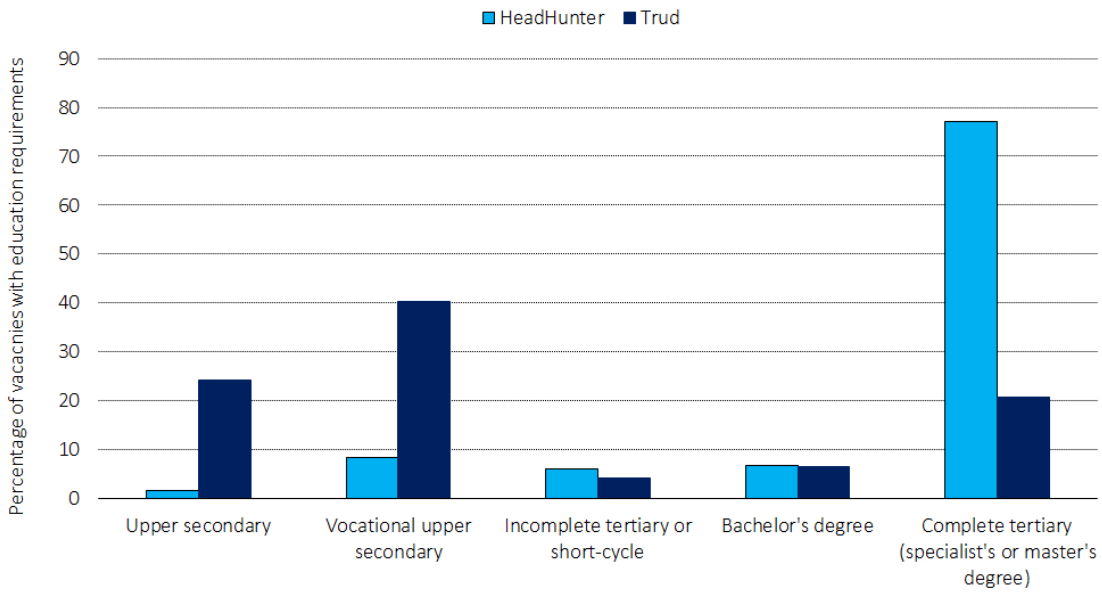
Source: HeadHunter data set (March 2015) and Trud (January-April 2015).

Note: Sectors are classified according to the revision 2 of the Statistical Classification of Economic Activities in the European Community, (NACE).

Education and Wage: HeadHunter has higher education requirements and better-paid jobs than Trud

Among HeadHunter's vacancies that require education (about half of them), 8 out of 10 vacancies require complete tertiary education (figure B.4). Trud, by contrast, requires complete tertiary education in only 2 vacancies that include education requirement out of 10; 40 percent of vocational secondary; and more than 20 percent regular secondary education.

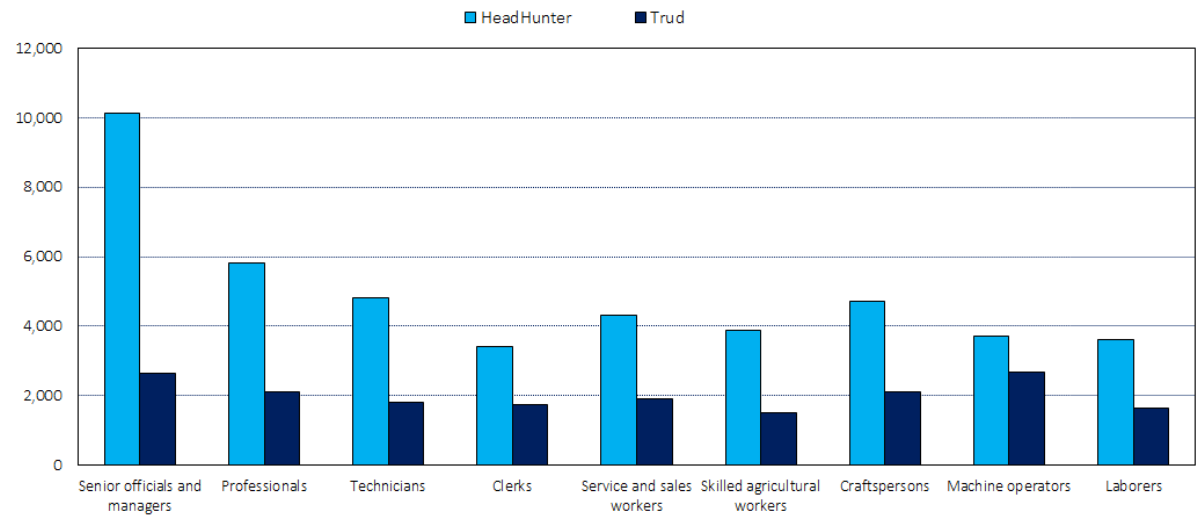
Figure B.4. Education requirements



Source: HeadHunter data set (February-March 2015) and Trud (January-April 2015).

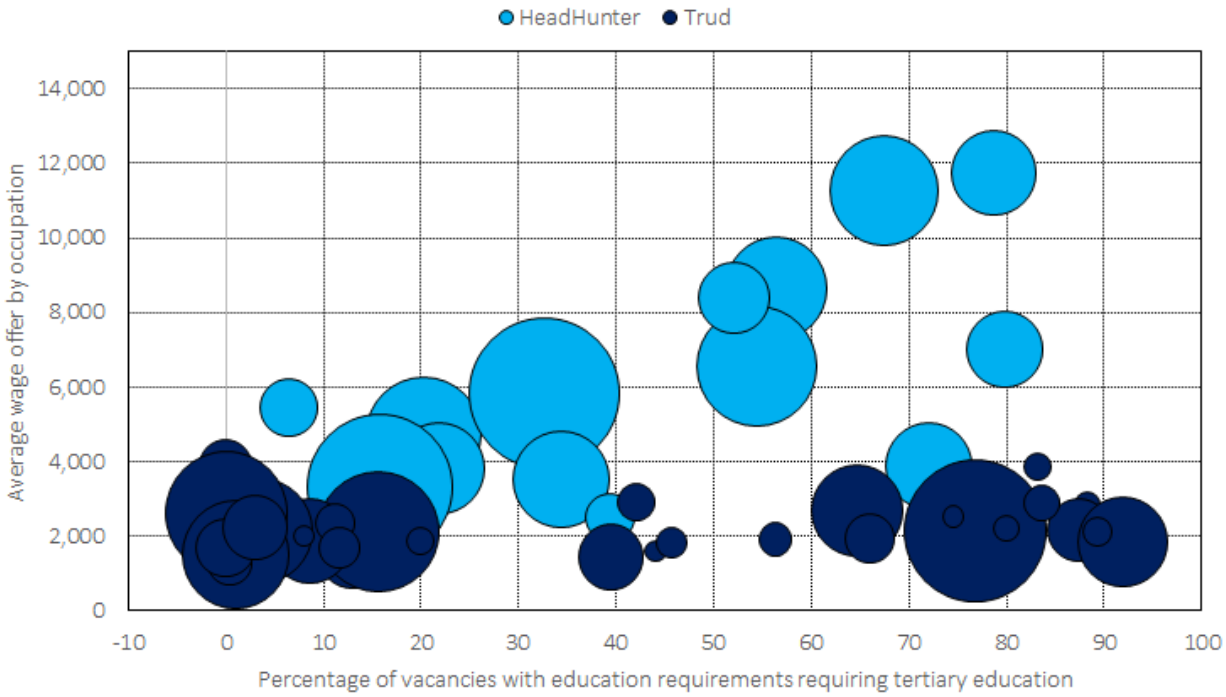
When specified, wage offers in HeadHunter are much higher than Trud, in all occupations (figure B.5), and increasingly so when a higher share of vacancies of a given occupation require tertiary education (figure B.6).

Figure B.5. Wage offers



Source: HeadHunter data set (February-March 2015) and Trud (January-April 2015).

Figure B.6. Wages and education by occupation



Source: HeadHunter data set (February-March 2015) and Trud (January-April 2015).

Note: The size of the bubble represents the percentage of the vacancies of one occupation among the total.

Summary

The job websites HeadHunter and Trud have the same purpose – advertising job vacancies in Ukraine, with the main difference in theory that all firms are supposed to advertise their vacancies in the public website, Trud. Yet, the two websites are different in many dimensions. Jobs advertised in HeadHunter are higher-skilled than Trud's. Even for the same broad occupation category, salaries offered in the jobs advertised in HeadHunter are higher than in Trud.

Appendix C. Definitions of skills

Table C.1. Definitions of cognitive skills

Dimension	No.	Skill	Definition
Advanced cognitive skills	1	Analytical and thinking skills	Ability to collect and analyze information
	2	Communication	The ability to convey information to another individual effectively, both orally and in writing
	3	Decision making	Ability to make decisions
	4	Foreign languages	Literacy in foreign language
	5	Knowledge	General knowledge such as history
	6	Learning	Ability to learn new things
	7	Literate speech	Correct use of native language
	8	Memory	Ability to remember
	9	Planning	Ability to look ahead and accomplish goals
	10	Problem solving	Process of working through details of a problem to reach a solution
	11	Quick	Speed of execution of tasks
	12	Time management	Ability to use one's time effectively
Basic cognitive skills	13	Literacy	Ability to read and write
	14	Numeracy	Ability to analyze number, quantity, and space

Source: Own elaboration based on job vacancies on HeadHunter online website, March 2015.

Table C.2. Definitions of socioemotional skills of the PRACTICE taxonomy

Dimension of socioemotional skills	Socioemotional skill	Definition	Sub-skills (Skills, Attitudes, Beliefs, Behaviors)	Related Big Five Personality Traits
Achieving goals	**Achievement motivation**	Orientation towards success, mastery, and sense of purpose. Associated with a high degree of independence and the drive to pursue difficult tasks work toward desired goals.	• Mastery orientation • Sense of purpose • Motivation to learn	• Conscientiousness (grit) • Openness to experience
	Ethics	The strength of character related to fairness, honesty, following rules, and a sense of responsibility, which reflects into actions.	• Honesty • Fairness orientation • Moral reasoning	• Conscientiousness
	Initiative	Inclination to lead and take charge, operate as a positive actor, and believe that outcomes depend on one's own actions rather than fate, chance, or others.	• Agency • Internal locus of control • Leadership	• Conscientiousness • Openness to experience
	(Social) problem-solving	Ways individuals solve social challenges, such a joining a group and resolving conflicts, by interpreting signals and emotional reactions and deciding how to respond.	• Social-information processing skills • Decision making • Planning	• Conscientiousness
Managing emotions	**Confidence**	Beliefs and feelings about oneself and one's abilities.	• Self-efficacy • Self-esteem • Positive identity	• Emotional stability
	Control	Ability to delay gratification, focus attention, and restrain impulses.	• Delay of gratification • Impulse control • Attentional focus • Self-management	• Conscientiousness
	Resilience	Ability to adapt to situations, bounce back from adversity, thrive in risky and stressful contexts, and realistically connect goals and one's own abilities.	• Stress resistance • Perseverance • Optimism • Adaptability	• Conscientiousness (grit) • Emotional stability
Working with others	**Teamwork**	Ability to deal with relationships by being helpful and agreeable, understanding others' feelings and points of view, communicating effectively, and not engaging in aggressive or bullying behaviors.	• Empathy/Prosocial behavior • Low aggression • Communication skills • Relationship skills	• Agreeableness • Extraversion

Source: Adapted from Guerra, Modecki, and Cunningham (2014).

Notes: * Although related, initiative and achievement motivation are distinct skills: initiative relates to any type of "take-charge" actions, such as suggesting a new project at work, while achievement

motivation is linked to a desire to succeed and is associated with setting long-term academic and career goals and following this pursuit despite obstacles that may occur along the way.

Table C.3. Definitions of Big Five personality traits

Dimension	Personality trait	Short definition
Achieving goals	Conscientiousness	The tendency to be organized, responsible, and hardworking
	Openness to experience	Appreciation for art, learning, unusual ideas and variety of experience
Managing emotions	Emotional stability	Predictability and consistency in emotional reactions, with absence of rapid mood changes
Working with others	Agreeableness	The tendency to act in a cooperative, unselfish manner
	Extraversion	Sociability, tendency to seek stimulation in the company of others, talkativeness

Source: Adapted from John and Srivastava (1999).

Table C.4. Definition of technical skills

No.	Technical skills	Definition
1	Accounting, economics, and finance	Knowledge of economic and accounting principles and practices, the financial markets, banking and the analysis and reporting of financial data.
2	Administration and Management	Knowledge of business and management principles involved in strategic planning, resource allocation, human resources modeling, leadership technique, production methods, and coordination of people and resources.
3	Communications and Media	Knowledge of media production, communication, and dissemination techniques and methods. This includes alternative ways to inform and entertain via written, oral, and visual media.
4	Cosmetology	Cosmetology is the study and application of beauty treatment, including caring for the condition of hair, skin, and nails.
5	Customer and personal service	Knowledge of principles and processes for providing customer and personal services. This includes customer needs assessment, meeting quality standards for services, and evaluation of customer satisfaction.
6	Data management and analysis	Strategies in collecting, processing, documenting, and summarizing data
7	Design	Knowledge of design techniques, tools, and principles involved in production of precision technical plans, blueprints, drawings, and models.
8	Fine Arts	Knowledge of the theory and techniques required to compose, produce, and perform works of music, dance, visual arts, drama, and sculpture.
9	Fitness	Includes aerobic exercise (jogging, walking, treadmill training, swimming, step aerobics and cycling) and body fitness systems like Tae Bo.
10	Foreign trade	Knowledge of exports and imports.
11	Knowledge of markets	Knowledge of actors, prices, and products of a market.
12	Knowledge of places	Knowledge of countries, cities, or regions, and willingness to travel.
13	Law and regulations	Knowledge of laws, legal codes, court procedures, precedents, government regulations, executive orders, agency rules, and the democratic political process.
14	Mathematics	Knowledge of arithmetic, algebra, geometry, calculus, statistics, and their applications.
15	Medical knowledge	The science and practice of the diagnosis, treatment, and prevention of disease.
16	Personnel and Human Resources	Knowledge of principles and procedures for personnel recruitment, selection, training, compensation and benefits, labor relations and negotiation, and personnel information systems.
17	Production and Processing	Knowledge of raw materials, production processes, quality control, costs, and other techniques for maximizing the effective manufacture and distribution of goods.
18	Programming and specialized software	Writing computer programs for various purposes and knowing software specific to a job.
19	Sales and Marketing	Knowledge of principles and methods for showing, promoting, and selling products or services. This includes marketing strategy and tactics, product demonstration, sales techniques, and sales control systems.
20	Secretarial Skills	Includes skills as writing (communicating effectively in writing as appropriate for the needs of the audience), active listening (Giving full attention to what other people are saying, taking time to understand the points being made, asking questions as appropriate, and not interrupting at inappropriate times), speaking (talking to others to convey information effectively). It also includes clerical knowledge (knowledge of administrative and clerical procedures and systems such as word processing, managing files and records, stenography and transcription, designing forms, and other office procedures and terminology).
21	Technology	Knowledge of technology products

Source: Adapted from the Occupational Information Network (O*NET), an online database of the United States that includes information on skills, abilities, knowledges, work activities, and interests associated with occupations.

Appendix D. Top-16 occupations in HeadHunter's vacancies, March 2015

Table D.1. Frequency of the top-16 occupations in HeadHunter's vacancies, by occupation category, March 2015

	1-digit occupation category	3-digit occupation category	Top-16 4-digit occupations	4-digit code	Freq.	%
High-skilled occupations	Senior officials and managers	Directors and chief executives	Directors and chief executives	1210	103	4
		Production and operations department managers	Production and operations managers not elsewhere classified	1229	79	3
		Other department managers	Other specialist managers not elsewhere classified	1239	101	4
	Professionals	Computing professionals	Computer systems designers, analysts and programmers	2131	153	6
			Computing professionals not elsewhere classified	2139	35	1
		Architects, engineers and related professionals	Architects, engineers and related professionals not elsewhere classified	2149	52	2
		Business professionals	Business professionals not elsewhere classified	2419	206	8
		Social science and related professionals	Philologists, translators and interpreters	2444	50	2
	Technicians	Computer associate professionals	Computer assistants	3121	60	2
		Finance and sales associate professionals	Technical and commercial sales representatives	3415	79	3
			Finance and sales associate professionals not elsewhere classified	3419	225	9
		Business services agents and trade brokers	Business services agents and trade brokers not elsewhere classified	3429	100	4
		Administrative associate professionals	Administrative secretaries and related associate professionals	3431	107	4
Medium-skilled occupations	Clerks	Secretaries and keyboard-operating clerks	Secretaries	4115	117	5
		Client information clerks	Receptionists and information clerks	4222	271	11
	Service and sales workers	Other personal services workers	Hairdressers, barbers, beauticians and related workers	5141	41	2

Source: Occupations categories come from the International Standard Classification of Occupations 1988 (ILO 1988). Frequencies and percentages are from job vacancies on HeadHunter online website, March 2015.

Note: Occupations were selected among the top 16 if they had more than 30 observations in the data set, a rule of thumbs for considering the minimum meaningful number of observations for an analysis.

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ABSTRACT

We explore online job vacancies from a Ukrainian website to assess the skills that employers look for among their new hires. We assess the demand for cognitive, socioemotional, and technical skills across a range of medium- and high-skilled occupations. We find that employers highly demand all three skills categories, much more than any education level. Most occupations demand a variety of different socioemotional skills while the demand for cognitive and technical skills focuses on one or two skills. Besides, cognitive and socioemotional skills appear as complementary: They are demanded similarly for a given occupation. Overall, online job vacancies are an informative complement to traditional sources to assess skills in demand.

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