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Is it better to invest in hard or soft skills?

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Abstract

Increasing awareness of the productive potential of soft skills has sparked a discussion of their systematic and purposeful development. However, education systems pay only limited attention to this topic in most countries and remain focused on the development of hard skills. Is this approach rational or inadequate? This article provides new evidence on different aspects of the wage returns to soft skills (as an approximation of their productivity), and thereby contributes significantly to the discussion of the role of educational institutions in their development. It provides evidence that soft skills are as productive as hard skills. Moreover, it suggests that the productivity of hard skills stems from their combination with soft skills. These conclusions do not correspond to the fact that the value of education is intermediated mainly by hard skills, resulting in unequal development of soft and hard skills in schools. While concluding that education systems should pay more attention to soft skills development, the analysis recognises that this attention should be differentiated according to employers' needs, owing to substantial differences in the value of soft skills across economic sectors. It is also noteworthy that while significant gender differences in returns to hard skills were identified, wage returns to soft skills appear gender neutral.

JEL Codes: J24, J31, J71

Keywords

Education, gender differences, hard skills, interaction, soft skills, wage returns

Introduction

Success in the labour market depends mainly on two kinds of skills (i.e. 'the capacity for carrying out complex, well-organised patterns of behaviour smoothly and adaptively so

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as to achieve some end or goal'; Reber and Reber, 2001: 683). They are required by employers from job applicants and employees (Balcar et al., 2014). These are hard skills (embodied in acquired qualifications) and so-called soft skills (e.g. overcoming barriers in communications, building relationships with customers, work planning, cooperation with others, etc.). Both types of skill significantly increase an individual's productivity (see section 'Overview of returns to soft skills'). This contribution to productivity, together with their complementarity, explains an enormous increase of employment in occupations requiring high levels of both hard and soft skills in the last decades (Borghans et al., 2006; Weinberger, 2011).

The soft skills in this article[1] represent learned behaviour based on individual's predispositions. They correspond more to acquired skills (with all that this implied in accordance with Becker, 1993) than to psychological traits, preferences, motivation and other predispositions usually called non-cognitive abilities (Heckman et al., 2006; Heckman and Rubinstein, 2001). The difference between these two categories can be illustrated by the distinction between communicativeness (a predisposition) and the ability to communicate effectively in a work environment (a soft skill) because even a person with a low degree of communicativeness can be a very good communicator (owing to knowledge of appropriate methods and tools) and can, for example, transmit complex information to others without any bias. Moreover, some soft skills are more closely connected with cognitive than non-cognitive abilities (e.g. problem solving, planning and organising or exploring and orientation in information).

Differences between hard and soft skills lie not only in limited connection with a qualification and missing credentials in the case of soft skills (as there is no diploma confirming the level of individual's soft skills) but also in their development. As the hard skills are closely related mainly to knowledge (e.g. the process of cold-welding, English grammar, accounting, etc.), they can be relatively easily trained for and measured. Soft skills, however, are more closely related to attitudes, defined as 'a stable, long-lasting, learned predisposition to respond to certain things in a certain way' (Statt, 1998: 10), stemming mainly from psychological traits, preferences, experience, background and so on. This makes their development slower and more difficult, because improving somebody's cooperation, for example, often requires changing his or her attitudes first and then assisting in the mastery of methods to improve that skill (Balcar et al., 2011). Moreover, the measurement of soft skills is difficult as there is no objective way to test the skill itself as opposed to hard skills (see section 'Measurement of soft skills').

Awareness of the productivity of soft skills and their complementarity to hard skills has sparked a discussion on the role of the education system in their development. Unfortunately, their systematic and purposeful development is still sporadic in most countries (for evidence from the European Union, see Balcar et al., 2011). The author believes that relevant and trustworthy information on different aspects of wage returns to soft skills can significantly contribute to this discussion. Therefore, this article focuses on answering the following questions: (a) How large are the respective returns to soft skills and hard skills? What skills are more profitable to invest in? (b) How much of wage variation can be explained by these skills? (c) What is the share of soft skills in returns to education? Is it constant across the whole education system? (d) Are there any gender differences in returns to soft skills? And if so, do they differ across occupations or sectors?

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Answers to these questions are worked towards gradually over the several sections of this article. The section 'Overview of returns to soft skills' provides evidence on the importance of soft skills for wage determination and closing the gender wage gap. The section 'Measurement of soft skills' discusses methodological approaches to the measurement of soft skills and the advantages of the approach adopted here. The section 'Data' focuses on description of the data used. The last section describes results of a regression analysis of wage returns to soft skills, and the conclusion establishes some implications for education policy and for gender pay equity.

Overview of returns to soft skills

What is known about the wage returns to soft skills, as observable and directly applicable behaviour important for high job performance (e.g. overcoming barriers in communications, building relationships with customers, work planning, cooperation with others, etc.), and closely related non-cognitive traits? This section provides a brief and highly selective overview of the empirical literature, focused only on the skills corresponding most closely to those considered by this article (see Note 1). For more elaborated overview of wage returns to soft skills, see Balcar (2014).

Borghans et al. (2006) focused on wage returns to a whole range of soft skills, whose presence was approximated by the importance of 'people tasks' for job performance. They also examined whether an individual's sociability (measured during childhood and early adulthood) is associated with a wage premium in jobs where people tasks are important. They found that individuals working in jobs where people tasks are important face lower wages. The wage penalty connected with a standard deviation increase in the importance of people tasks was estimated at circa 5% in US and 4%–9% in the UK. Most sociability variables, though not all, indicated a very low wage premium in those jobs (circa 1%).

Bacolod and Blum (2008) estimated wage returns to people skills, cognitive skills and motor skills. They found that wage returns to people skills nearly doubled during the years 1968–1990 (one standard deviation increase in people skills was associated with a 3.2% wage increase in 1968 and 6.0% increase in 1990), while returns to cognitive skills increased 'only' by 60% and returns to motor skills decreased by −50%. Detailed examination revealed that people skills have no value themselves, but only as a complement to other skills. The growth of wage returns to people skills was, in fact, caused by increasing returns to a combination of cognitive (or motor) and people skills during the years 1968–1990. These findings correspond to those of Weinberger (2011) who identified a significant growth of employment only in jobs requiring both cognitive and people skills (in this case leadership).

Borghans et al. (2008) applied a novel approach to the examination of wage returns to soft skills by focusing on an interpersonal interaction approximated by a trade-off between directness, which facilitates accurate communication, and care, which establishes a cooperative environment. They found a significant increase in returns to directness during the examined period, as a one standard deviation increase in directness relative to care raised wages by 9.6% in 1997 and 10.8% in 2001 in the UK, and by 3.8% in 1979 and 10.2% in 1998 in Germany. The wage premium for directness was higher in occupations where it is more important.

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Kuhn and Weinberger (2005) focused on wage returns to leadership skills in the case of White US males. These skills were measured by the observable leadership activities of individual during study at high school and by their self-assessment. These leadership variables were regressed on annual and hourly earnings 9–13 years later. Estimates showed an earnings premium for men who had led sporting teams or social organisations at high school and who self-assessed as having leadership skills. The authors also found that such males had a higher probability of subsequently occupying managerial roles.

The reviewed articles (Balcar, 2014) show that changes in employers' requirements for soft skills in employees, accompanied by corresponding development of their wage returns, together with changes in distribution of these skills between genders, led to a significant reduction of the gender wage gap. This conclusion is consistent with the results of Bacolod and Blum (2008), Black and Spitz-Oener (2007) and Borghans et al. (2006).

Measurement of soft skills

It is very difficult to measure soft skills (e.g. cooperation, consumer orientation, leadership, etc.) as there is no test, according to author's knowledge, which objectively assesses the individual's workplace behaviour as it is an interactive process depending on context. Observation, which is a suitable method for this task, is too expensive for application on big samples. Empirical literature focused on wage returns to soft skills uses two different measurement methodologies (Balcar, 2014). The direct one is based on questioning individuals on their past behaviour approximating given skills (e.g. Kuhn and Weinberger, 2005; Weinberger, 2011); the indirect one approximates an individual's soft skills by job tasks (e.g. Bacolod and Blum, 2008; Black and Spitz-Oener, 2007; Borghans et al., 2006, 2008), which are identified by trained experts or workers themselves.[2] The indirect approach raises a question whether it measures soft skills reliably. The approximation of individual's skills by job tasks is supported by empirical studies finding a statistically significant match of soft skills with job tasks (Borghans et al., 2006, 2008; Weinberger, 2011) or at least job type (Kuhn and Weinberger (2005) match leadership skills with employment in managerial jobs). Such attempts at approximation correspond to the fact that soft skills represent a decisive criterion for hiring, while qualifications are used for a preselection of job applicants (Balcar et al., 2011). The result is that only individuals with soft skills at the required level (or as close to it as possible) are hired, as their subsequent development is slow and expensive (see 'Introduction'). This also solves the potential problem with reverse causality between soft skills and performed job. Evidence in this paragraph suggests that an indirect approach to soft skills measurement through job characteristics provides relevant data.

The indirect approach to the approximation of soft skills is used also in this article, but it goes further than the reviewed papers by shifting focus from the necessity of particular soft skills for job performance (usually approximated by tasks performed) to levels of their mastery. This focus enables more accurate estimation of returns to soft skills, avoiding the problem that skills at a low or average level of mastery may still be highly important for job performance. Results of the model focusing on the importance of soft skills would be then significantly different in comparison with a model focusing on their level.

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Data

The estimation of wage returns to soft skills is based on a special dataset from the Czech Republic containing detailed information on 1500 employees aged 25–54 years, including levels of 15 soft skills needed for their job. It is based on three data sources: a tailor-made survey of employees, the Albertina Firm Monitor and the National System of Occupations (NSP – *Národní soustava povolání*).

The tailor-made survey[3] (hereafter the Survey) was conducted in order to gather individual data on Czech employees aged 25–54 years. Its structure reflects main areas of current economic research on wage determination; thus, it provides information particularly on respondents' income, personal characteristics, education, work experience, preferences related to job, family and life roles, physiologic characteristics, psychological traits and characteristics of family background, household and workplace. Data for a representative sample of 1,984 employees aged 25–54 years were gathered through standardised face-to-face interviews conducted by 481 interviewers from the FOCUS Social and Marketing Research Agency[4] in October and November 2011. As a quota sampling method was employed, the interviewers were obliged to ensure a structure of respondents (employed persons only) according to sex, age, education, region and size of municipality of residence (only one respondent per household was allowed) corresponding to the structure of employees aged 25–54 years in the Czech Republic published by the Czech Statistical Office. Data verification was performed also by the FOCUS Agency. This dataset was augmented with information on employers' characteristics (from the Albertina Firm Monitor) and soft skills required for each occupation (from NSP).[5]

The Albertina Firm Monitor[6] provides information on approximately 2.7 million economic subjects with national identification number in the Czech Republic. It allowed augmentation of the original data with information on some employers' characteristics (e.g. economic sector, number of employees, date of origin, ownership and legal form).

NSP[7] (hereafter the System) is a public database of occupations providing detailed information on job tasks, qualification requirements, health requirements, working conditions, wage levels and vacancies for particular occupations. The relevancy of information in the System is guaranteed by sector councils representing employers, professional organisations, educators and other experts in human resources in particular sectors and branches (NSP, 2011). The System also specifies requirements for 15 soft skills for each occupation (see Note 1). It does not provide information on how important a skill is for job performance but does specify the level of each soft skill required, using a tailor-made behavioural description based on a 6-point scale, which significantly increases the accuracy of soft skills measurement. Table 1 provides an example of a definition and the six-level behavioural descriptor scale for a chosen soft skill. For information on all 15 soft skills (see online Appendix 1, http://elr.sagepub.com/content/by/supplemental-data).

As occupations defined by the System do not correspond to International Standard Classification of Occupations (ISCO classification), manual matching of Survey respondents with occupations in the System was necessary. It was performed by experts, who designed the classification of soft skills (see Appendix 1) and specified soft skills requirements on occupations in the System. Unfortunately, matching was not possible in all cases, resulting in significant erosion of the original sample to 1,500 respondents (156

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Table 1. Description of effective communication from National System of Occupations (NSP).

Skill		Level	
Effective communication	Description: It is an ability to communicate actively (including presentation skills), listen and argue.	0	He or she formulates his or her ideas in both speech and writing with big difficulties; his or her ability to listen to others is limited; provision of information is occasional, sporadic and fragmentary.
	Sub-skills: ability to take reactions of others into account (ability to understand verbal and non-verbal information) ability to overcome barriers in communication ability to accept and work with arguments of others ability to express oneself clearly and comprehensibly ability to express oneself in writing ability to be assertive, express disagreement capability of self-reflection ability to adjust communication style, get attention of recipients and anticipate their reactions ability to present information to others	1	He or she formulates ideas, especially in writing form, with difficulties; tends to have problems with listening to others; provides information only on request; his or her reactions to unexpected situations are not predicable.
		2	He or she manages to formulate ideas clearly both in speech and writing in regular situations, listens to others without significant problems, provides information to others, reacts to the situation adequately, his or her communication is not always convincing.
		3	He or she formulates ideas in both speech and writing clearly, listens to others, reacts assertively to a developing situation, is capable of capturing other people's attention, tolerates other people's opinions.
		4	His or her ability to formulate ideas in both speech and writing is at a very good level, he or she listens to other people actively, adequate level of self-enforcement is natural for him or her, is capable of presenting to a group, is capable of opening the communication, provides an environment conducive to communication of all participants, welcomes and works with other people's opinions, can create constructive conflict, requests feedback.
		5	His or her ability to formulate ideas in both speech and writing is excellent, he or she practices active listening without exception in all circumstances, adequate level of self-enforcement is natural for him or her, is able to address big audience and persuade others, can elicit real opinion from other people and work with them, uses constructive conflicts; utilises feedback, communicates with other cultures.

Source: NSP (2011).

respondents were excluded because of missing information in the System and 328 respondents were excluded in order to restore sample representativeness). Owing to successful and unbiased matching of respondents with occupations in the System, it was possible to replenish the original dataset with information on levels of 15 soft skills demanded from each respondent in order to fulfil requirements of his or her occupation. For definitions of variables employed in this article, including their descriptive statistics, see online Appendix 2 (http://elr.sagepub.com/content/by/supplemental-data).

Wage returns to hard and soft skills

The original version of Mincer's (1974) wage equation, explaining differences in individuals' wages by knowledge and skills acquired through education and work experience, was used as a base model in the analysis. It was hypothesised that its relevancy and predictive power would be increased by the inclusion of a soft skills variable (approximated by job requirements for a soft skills level), enabling both the estimation of the returns to particular soft skills and the elimination of their influence on education and work experience variables, whose regression coefficients would thus provide information on returns only to hard skills. Subsequent model modifications would shed light on the importance of soft and hard skills for wage determination, the role of the education system in soft skills accumulation and gender differences in returns to soft skills (see equation (1); each parenthesis represents significant model modification).[8] All models in the article use gross monthly wage as the dependent variable.[9] It can be noted that the results, to the author's knowledge, provide the first estimation of wage returns to soft skills for the Czech Republic

$$\ln w = f\left[\begin{array}{l}(\text{education}, \text{work experience}, \text{location}), (\text{soft skills}), (\text{gender}), \\ \left(\begin{array}{l}\text{physical characteristics}, \text{cognitive and noncognitive traits}, \\ \text{family}, \text{background}\end{array}\right), \\ (\text{job}, \text{employer})\end{array}\right] \quad (1)$$

It proved unrealistic to include as regressors all 15 soft skills defined by the NSP and to estimate wage returns to each of them because of high mutual correlation among these skills (the Pearson correlation coefficient reached values of 0.33–0.49 only in six cases, 0.5–0.69 in 27 cases and 0.7–0.86 in 72 cases). Factor analysis revealed that the set of soft skills could be represented by communication skills, which would explain 74.26% of the variability in the original soft skills variables, but the mean level of all 15 soft skills provided even better results (slightly over 75%). Therefore, the latter was chosen as the variable approximating individual's soft skills in the wage models. It is noteworthy that Cronbach's alpha (at the value of 0.959) suggests that soft skills defined by the NSP represent a reliable measurement of the general level of individuals' soft skills.

An estimation of Mincer's model without soft skills variable (Model 1 in Table 1) provided standard and expected results. An additional year of schooling[10] was associated with a wage premium at the level of 6.51%. Returns to different educational levels, compared to primary education, International Standard Classification of Education 2A/European

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Qualification Framework 2 (ISCED 2A/EQF 2), revealed that students of secondary general or technical schools, ISCED 3A/EQF 4, gained double returns to their educational level (24.80%) compared with their friends at secondary vocational schools, ISCED 3C/EQF 3 (12.61%), and they could double these returns again by reaching a masters or doctoral degree, ISCED 5A and 6/EQF 7 and 8 (55.14%); see Model 9 in Table 3.[11] Tenure was also a statistically significant wage predictor, whose returns reached the value of 2.19% per year. A year of other work experience was connected approximately with 1.47% wage premium, which confirms a higher relevance of experience acquired in current employment.

Education and work experience develop both hard and soft skills. Inclusion of a soft skills variable (Model 2 in Table 2), which approximates the level of their development, enabled separation of returns to these different kinds of skills (therefore, the variables education, tenure and other work experience in all models except Models 1 and 9 represent only hard skills). The returns to one standard deviation of soft skills (i.e. 0.8459 of a behavioural level at 6-point scale defined by the NSP) are equal to 8.51%. The inclusion of soft skills significantly influenced returns to education, which suggests that the educational system plays an important role in the accumulation of not only hard skills but also soft skills. The return to a year of schooling decreased from 6.51% (returns to both hard and soft skills) to 4.23% (returns only to hard skills), which means a decrease of regression coefficient by −35.02%. An analysis of changes in regression coefficients for different levels of education brings interesting results (compare the results of Models 9 and 10 in Table 3). The relative decrease in wage returns was similar for all educational levels (decrease of regression coefficients from −30.03% to −34.07%), except secondary vocational schools (regression coefficient decreased by −23.47%). These findings suggest that the proportion of soft skills to hard skills development is relatively stable across the whole Czech education system, except secondary vocational schools, which are more focused on development of hard skills. Inclusion of a soft skills variable had only a minor impact on returns to tenure, that is, the change of returns from 2.19% to 1.98% (regression coefficient decreased by −9.59%), and minimal impact on returns to other work experience (the change of regression coefficient was smaller than 5.00%). These results support the existence of specific soft skills, whose value is bounded only or mainly with the place of their accumulation (e.g. a firm-specific form of communication with clients), although the theoretical literature assumes all soft skills to be generic and thus transferable. They also suggest that work experience for both current and previous employers leads mainly to the accumulation of hard skills.

A comparison of the standardised beta coefficients of hard skills acquired through a year of schooling (0.2388) and soft skills (0.2301) in Model 2 suggests that the importance of each as a wage predictor is nearly the same. This inference can be illustrated by the wage returns to one standard deviation of each kind of skills, which were 8.84% for hard skills and 8.51% for soft skills. Also, the contribution of these skills to explaining variance in gross monthly wage can be mentioned. The coefficient of determination (R^2) of Model 2 without Location variables (not shown here) reached the level of 0.2282. The Owen decomposition of R^2 revealed that the shares explained by hard skills acquired by schooling (40.10%) and by soft skills (39.22%) were equal. The importance of soft skills for explaining variance in the gross monthly wage can be illustrated also by a simple comparison of the R^2 of models with (0.251) and without (0.216) the soft skills variable.

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Table 2. Returns to hard and soft skills, Czech Republic, 2012.

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	ln gross monthly wage	ln gross monthly wage	ln gross monthly wage	ln gross monthly wage	ln gross monthly wage	ln gross monthly wage	ln gross monthly wage
Education							
Years of schooling	0.0651*** (0.007)	0.0423*** (0.004)	0.0267** (0.009)	0.0293*** (0.004)	0.0179* (0.008)	0.0248*** (0.004)	0.0165** (0.006)
Years of schooling × Female			0.0268** (0.010)		0.0243** (0.007)		0.0190*** (0.005)
Soft skills							
Soft skills (mean level of 15 soft skills)		0.1006*** (0.018)	0.1259*** (0.011)	0.0792*** (0.012)	0.0863*** (0.011)	0.0398** (0.014)	0.0427** (0.014)
Soft skills × Female			−0.0173 (0.028)		−0.0109 (0.028)		0.0014 (0.026)
Work experience							
Tenure	0.0223*** (0.005)	0.0202*** (0.005)	0.0171*** (0.005)	0.0137** (0.005)	0.0136** (0.005)	0.0097** (0.004)	0.0098** (0.004)
Tenure squared	−0.0004* (0.000)	−0.0004* (0.000)	−0.0003 (0.000)	−0.0003 (0.000)	−0.0003 (0.000)	−0.0002 (0.000)	−0.0002 (0.000)
Other work experience	0.0152*** (0.003)	0.0159*** (0.003)	0.0138*** (0.002)	0.0103*** (0.002)	0.0103*** (0.002)	0.0097*** (0.002)	0.0096*** (0.002)
Other work experience squared	−0.0005*** (0.000)	−0.0005*** (0.000)	−0.0005*** (0.000)	−0.0003*** (0.000)	−0.0003*** (0.000)	−0.0004*** (0.000)	−0.0004*** (0.000)
Life-long work career specialisation				YES	YES	YES	YES
Gender (female)			−0.5625*** (0.099)	−0.1752*** (0.024)	−0.4704*** (0.081)	−0.1354*** (0.015)	−0.3971*** (0.083)
Physical characteristics[a]				YES	YES	YES	YES
Cognitive and non-cognitive traits[b]				YES	YES	YES	YES
Family characteristics[c]				YES	YES	YES	YES
Background characteristics[d]				YES	YES	YES	YES

(Continued)

Table 2. (Continued)

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	ln gross monthly wage	ln gross monthly wage	ln gross monthly wage	ln gross monthly wage	ln gross monthly wage	ln gross monthly wage	ln gross monthly wage
Job characteristics[e]						YES	YES
Employer characteristics[f]						YES	YES
Location[g]	YES	YES	YES	YES	YES	YES	YES
Constant	8.8976*** (0.081)	8.9220*** (0.069)	9.2167*** (0.074)	9.1591*** (0.059)	9.2977*** (0.062)	9.3365*** (0.048)	9.4561*** (0.053)
Observations	1500	1500	1500	1500	1500	1500	1500
Adjusted R^2	0.216	0.251	0.372	0.429	0.432	0.517	0.519

Source: Author.

Robust standard errors in parentheses.

[a]Health limitation of work performance, Difference between individual's height and average gender height, Body mass index (BMI) categories.

[b]Grades from math at age 15, Strong need to excel and be better than others, Persistence in following difficult goals, Self-esteem, Locus of control, Highest life priority, Feeling of personal responsibility for ensuring an adequate income, Feeling of personal responsibility for ensuring everyday housework and taking care of children, Loss of individual's income would lead to significant decrease of living standard, Preference of job security, Preference of job flexibility, Preference of individual's self-fulfilment, Preference of less demanding and stressful work, Preference of good interpersonal relations at the workplace.

[c]Marital status, Number of children in 5 age categories.

[d]Number of siblings, Mother tongue.

[e]Occupation according to 1-digit International Standard Classification of Occupations (ISCO classification), Prevailing economic activity according to Statistical Classification of Economic Activities (NACE classification), Workload, Difference in number of hours really devoted to a work and official workload, Absenteeism, Field of education and job match, Work performance dependence on co-workers, Not strictly specified working process and freedom to create/try new working processes, Rate of subjectivity in wage-system, Relation with boss, Way of getting the job.

[f]Number of employees, Ownership, Natural person dummy, Age of firm/institution.

[g]Region according to Nomenclature of Territorial Units for Statistics (NUTS 3), Residence town size.

***p < 0.01; **p < 0.05; *p < 0.1.

Table 3. Returns to interactions of hard and soft skills, Czech Republic, 2012.

Variables	(2)	(8)	(9)	(10)	(11)	(12)
	ln gross monthly wage	ln gross monthly wage	ln gross monthly wage	ln gross monthly wage	ln gross monthly wage	ln gross monthly wage
Education × Soft Skills						
Years of schooling × Soft Skills		0.0011 (0.006)				
Secondary vocational schools × Soft Skills					0.0652** (0.019)	0.1680*** (0.018)
Secondary general or technical schools × Soft Skills					0.0611* (0.030)	0.1586*** (0.033)
Tertiary professional school × Soft Skills					0.0807* (0.037)	0.1900*** (0.056)
Tertiary professional school, bachelor degree × Soft Skills					0.1414** (0.059)	0.2738*** (0.058)
University, bachelor degree × Soft Skills					0.0120 (0.068)	0.1230* (0.057)
University, master or doctoral degree × Soft Skills					0.0656 (0.059)	0.1691*** (0.042)
Education						
Years of schooling	0.0423*** (0.004)	0.0388* (0.020)				
Primary education (ISCED 2A/EQF 2)			omitted	omitted	omitted	omitted
Secondary vocational schools (ISCED 3C/EQF 3)			0.1261* (0.057)	0.0965 (0.061)	−0.0377 (0.060)	−0.3313*** (0.053)
Secondary general or technical schools (ISCED 3A/EQF 4)			0.2480*** (0.045)	0.1635*** (0.048)	0.0392 (0.104)	−0.2628** (0.106)
Tertiary professional school (ISCED 5B/EQF 6)			0.3983*** (0.042)	0.2787*** (0.044)	0.0906 (0.165)	−0.3017 (0.198)
Tertiary professional school, bachelor degree (ISCED 5A/EQF 6)			0.4126*** (0.038)	0.2805*** (0.042)	−0.1172 (0.209)	−0.5883** (0.180)
University, bachelor degree (ISCED 5A/EQF 6)			0.3900*** (0.037)	0.2610*** (0.038)	0.3022 (0.217)	−0.0363 (0.197)
University, master or doctoral degree (ISCED 5A and 6/EQF 7 and 8)			0.5514*** (0.055)	0.3728*** (0.055)	0.2317 (0.221)	−0.1676 (0.156)
Soft Skills						
Soft skills (mean level of 15 soft skills)	0.1006*** (0.018)	0.0860 (0.081)		0.0970*** (0.015)	0.0352*** (0.008)	−0.1240*** (0.020)
Work experience	Yes	Yes	Yes	Yes	Yes	
Work experience + Life-long work career specialisation						Yes
Gender						Yes
Physical characteristics[a]						Yes
Cognitive and non-cognitive traits[b]						Yes
Family characteristics[c]						Yes
Background characteristics[d]						Yes
Job characteristics[e]						Yes
Employer characteristics[f]						Yes
Location[g]	Yes	Yes	Yes	Yes	Yes	Yes
Constant	8.9220*** (0.069)	8.9683*** (0.263)	9.5150*** (0.019)	9.3267*** (0.019)	9.4530*** (0.028)	9.9090*** (0.056)
Observations	1500	1500	1500	1500	1500	1500
Adjusted R^2	0.251	0.250	0.218	0.249	0.248	0.518

Source: Author.
ISCED: International Standard Classification of Education; EQF: European Qualification Framework.
Robust standard errors in parentheses.
Work experience comprehends Tenure, Tenure squared, Other work experience, Other work experience squared.
[a–g]See notes a–g under Table 2 for a specification of other control variables.
***p < 0.01; **p < 0.05; *p < 0.1.

The importance of both hard and soft skills for wage determination raises the question of gender differences in their returns as there is evidence that returns to education (i.e. hard and soft skills together) differ significantly between men and women in the Czech Republic (Chase, 1997; Flanagan, 1998). Model 3 in Table 2 shows the estimation of Model 2 extended by a gender variable and its interactions with years of schooling (approximating hard skills) and soft skills. It revealed that there was a statistically significant gender difference in returns to hard skills at the level of 2.68% for an additional year of schooling for women (it doubled their returns to hard skills in comparison with men). Returns to soft skills, on the other hand, were 1.46% per one standard deviation higher in the case of men, but the difference was statistically insignificant. This means that returns to soft skills are gender neutral. This evidence suggests that the gender differences in returns to education reported by Flanagan (1998) and Chase (1997) were connected with differences in returns to hard skills, not soft skills.[12]

It should be noted that regression coefficients of hard and soft skills, as well as their gender differences, can be significantly affected by (a) omitted personal variables relevant to their accumulation and (b) segregation of men and women into different occupations and economic sectors. The problem of segregation can be illustrated by the fact that re-estimation of Model 3 without employees working in managerial occupations, ISCO 1 (not shown here), led to a decrease in the coefficient of gender and soft skills interaction by −41.04% as returns to soft skills are substantially higher in these occupations and they are performed more often by men than women (4.25% of men and 2.57% of women in the sample). Also, re-estimation of Model 2 extended by prevailing economic activity variables according to Statistical Classification of Economic Activities (NACE classification), (Eurostat, 2016) and their interactions with soft skills (not shown here) confirmed differences in returns to soft skills across economic sectors (compared with Manufacturing with 8.39% returns to one standard deviation of soft skills). Statistically significant sector premia for soft skills were identified in accommodation and food service activities, NACE I (16.95% per one standard deviation of soft skills); financial and insurance activities, NACE K (9.07%); professional, scientific and technical activities, NACE M (12.27%, statistically significant at 0.1 level); and arts, entertainment and recreation, NACE R (9.90%). On the other hand, agriculture, forestry and fishing, NACE A, and transportation and storage, NACE H, were identified as sectors with significantly lower returns to soft skills (compared to Manufacturing, NACE C).[13] New model specifications, augmented by (a) personal characteristics and (b) job and employers characteristics, were estimated in order to overcome the described deficiencies of Models 1–3. However, this changed their focus from an assessment of general productivity of hard and soft skills (e.g. useful for a decision on development of soft skills in the frame of education system) to productivity in specific conditions (e.g. useful for decision on further development of these skills of already employed individuals).

Model 4 in Table 1 represents a wage model with detailed information on individual cognitive and non-cognitive traits, preferences and other characteristics, which can influence wages both directly and indirectly through their impact on acquired level of hard and soft skills. The magnitude of the indirect effect will be reflected by a decrease in the corresponding regression coefficients. Inclusion of personal, family and background characteristics (compared to the Model 2) led to a decrease of returns to a year of

schooling approximating hard skills acquisition from 4.23% to 2.93% (a decrease in the regression coefficient by −30.73%) and in returns to one standard deviation of soft skills from 8.51% to 6.70% (a decrease in the regression coefficient by −21.27%), suggesting the significant role of the newly controlled variables on hard and soft skills development. However, introduction of the new variables (compare results of Models 5 and 3) had no effect on gender differences in returns to a year of schooling, but led to decreased gender differences in returns to soft skills (the coefficient remained statistically insignificant). The comparison of standardised beta coefficients in Model 4 suggested that development of soft skills (0.1811) can be slightly more profitable than development of hard skills through schooling (0.1655). It can be also noted that the predictive power of Model 2 ($R^2 = 0.251$) increased substantially by adding variables on personal, family and background characteristics (R^2 of Model 4 reached the value of 0.429).

Levels of education, soft skills, cognitive and non-cognitive abilities, preferences and other personal characteristics usually have a crucial effect on both choice of a desirable job made by an individual and selection of a suitable worker made by an employer. There may be some (and maybe substantial) indirect effect of these factors on wages through their influence on job characteristics. This raised the question of whether hard and soft skills have any direct effect on wages when job and employer characteristics are controlled, or whether they are entirely sterile and their effect on wages is intermediated only by acquired job. This question has very practical consequences as it shows whether investment in the further accumulation of hard and soft skills of employed individuals has any influence on productivity. Some positive effects are expected because, for example, more skilled managers (ISCO 1) in Manufacturing (NACE C) can lead their teams more efficiently or can perform more demanding managerial positions, which both should lead to higher wages. Model 6, which augmented Model 4 with job and employer variables, was used for a verification of this assumption.

The inclusion of job and employer characteristics (Model 6 in Table 1) decreased both returns to hard skills acquired by a year of schooling to the level of 2.48% (a decrease of regression coefficient by −15.36% in comparison with Model 4) and returns to one standard deviation of soft skills to the level of 3.37% (a decrease of the regression coefficient by −49.75%). This shows that both kinds of skills are productive even controlling for a wide range of personal, job and employer characteristics. Gender differences in returns to hard skills decreased to the level of 1.90% per year of schooling (by −21.81%) and remained statistically significant (compare Models 7 and 5). On the other hand, there were practically no gender differences in returns to soft skills as the corresponding beta coefficient was statistically insignificant and its value was close to zero. The comparison of standardised beta coefficient in Model 6 confirmed, as in previous models, that hard skills acquired by schooling (0.1410) and soft skills (0.0910) belong, together with tenure and work experience, to the most important wage predictors. It can be noted that job and employer variables significantly increased the predictive power of the model as R^2 increased from 0.429 to 0.517.

Although the article discussed the returns to hard and soft skills separately, job applicants and employees need them both to succeed in the labour market (Balcar et al., 2014). The complementarity of these skills was tested by re-estimation of Model 2 with an interaction term of soft skills and years of schooling (Model 8 in Table 3). The results showed

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a decrease of statistical significance of both years of schooling (statistically significant at the level of 0.1) and soft skills (statistically insignificant). However, the interaction term was also found statistically insignificant (beta coefficient 0.0011). As these results can be caused by non-linear productive effects of soft and hard skills interaction, the model was re-estimated also with education levels instead of years of schooling (Model 11 in Table 3). This specification brought expected results. Variables for particular education levels were found statistically insignificant, soft skills (surprisingly) remained statistically significant and positive, and the interactions of soft skills and educational levels (approximating hard skills) were found positive and statistically significant except university education. Further extension of the model by individual, employer and job characteristics (Model 12 in Table 3) led to a substantial increase in beta coefficients and statistical significance of the interaction of soft and hard skills. These models thus suggest that the productive effect of hard and soft skills consists in their combination.

Conclusion

There are no doubts that hard skills embodied in acquired qualifications are necessary for labour market success. This generally accepted fact (proved also by many empirical studies) is mirrored in education systems, which prepare young people for their future occupations mainly by accumulation of all necessary hard skills. The importance of soft skills for labour market success and their development in the frame of education system is a topic that has created much discussion in many countries in recent years. Therefore, this article has brought new evidence on many aspects of soft skills in order to show how much attention should be really paid to them and their development. Are 'soft skills' only a popular concept with minimal productive effect or are they even more important than hard skills? Should they be really developed at schools?

Estimations of models with the soft skills variable enabled an assessment of wage returns to hard and soft skills separately. According to expectations, hard skills proved to be a statistically significant wage determinant with the potential to explain a great deal of variance in wages. Some positive and statistically significant effect on wages was expected also in the case of soft skills, but the results exceeded all expectations. The analysis provided here has established that soft skills are as important a wage determinant as hard skills. One standard deviation increase in hard skills brought a wage premium on the order of 8.84%; the same increase of soft skills was accompanied by a 8.51% wage increase. Therefore, the degree of attention devoted to the development of soft skills and hard skills should be similar. Even if a number of personal, employer and job characteristics were added into the model, both hard and soft skills variables remained positive and statistically significant. This proved that on-the-job training to develop both hard and soft skills is rational as it has positive effects on worker's productivity. The importance of developing both hard and soft skills can be further emphasised by the evidence suggesting that soft skills and in particular hard skills are productive only when they are used together (it stems from Models 11 and 12).

The important implications of this article are that a simultaneous accumulation of soft and hard skills in the framework of the education system would be the most appropriate solution (suitable pedagogical methods for intensive development of soft skills without

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any negative impact on hard skills accumulation are available). In fact, education systems already play some role in soft skills development (introduction of soft skills variable into Model 1 led to a decrease of beta coefficient of education by −35.02%), but their systematic and purposeful development is still sporadic in most countries (Balcar et al., 2011). For instance, the setting of educational aims according to requirements in relevant occupations or economic sectors, development of necessary skills and their assessment are common practice at schools in the case of hard skills development, but very rare in case of soft skills.

Gender differences in returns to hard and soft skills were examined as well. The estimations showed that there are statistically significant differences in returns to hard skills in favour of women (regardless of model specification), but no statistically significant gender differences in returns to soft skills.

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Notes

1. Soft skills in this article are represented by the following skills: effective communication, cooperation, creativity, flexibility, consumer orientation, efficiency, independence, problem solving, planning and organising, life-long learning, proactive approach, stress resiliency, exploring and orientation in information, leadership and influencing others. For a definition of each skill, including levels of their mastery, see online Appendix 1 (http://elr.sagepub.com/content/by/supplemental-data).
2. Borghans et al. (2006) suggest that job tasks identified by workers and trained experts do not differ significantly.
3. Questions for the Survey were designed (in alphabetic order) by: Jiří Balcar (RPIC-ViP s.r.o.), Lenka Filipová (VSB-TU Ostrava), Jaromír Gottvald (VSB-TU Ostrava), Lenka Janíková (OKIN Group, a.s.), Zuzana Machová (VSB-TU Ostrava), Mariola Pytlíková (Aarhus University) and Petra Vašková (VSB-TU Ostrava). Valuable comments were provided also by Alicia Adsera (Princeton University), Tor Eriksson (Aarhus University), Armin Falk (Bonn University), James Heckman (University of Chicago), Leslie Stratton (Virginia Commonwealth University) and anonymous respondents participating in two pilot surveys.
4. For more information on the agency, see FOCUS Marketing and Social Research (2015).
5. Basic description of data gathered in the frame of the Survey can be found in Balcar et al. (2012).
6. For more information on the Albertina Database, see Bisnode (n.d.). Albertina CZ Silver Edition 4/2011 was used because it provided relevant information on the quarter, when the Survey was undertaken.
7. For more information on the National System of Occupations (NSP), see NSP (n.d.).
8. High attention was paid to data verification and model specification. First, a check of data was performed in order to exclude observations with unrealistic (extreme) values and obvious measurement errors. Although model specification was primarily based on theoretical assumptions and empirical evidence in the field of wage determination, the inclusion of variables into the model was influenced also by a check for empty or small cells by developing crosstabs between categorical predictors and the outcome variable in order to support model stability and check for correlation between variables in order to avoid potential

problem of multicollinearity. Subsequent tests of model estimations for multicollinearity (variance inflation factor test) and specification errors (Ramsey RESET test and link test) found no misspecification. Tests for heteroskedasticity and autocorrelation, on the other hand, identified some violations of Ordinary Least Squares (OLS) method assumptions. An appropriate method of robust standard errors was applied in these cases (clustered by field of education), but led only to minimal changes in standard errors and nearly no change in statistical significance of regression coefficients, suggesting the magnitude of heteroskedasticity and autocorrelation was not substantial. Application of robust standard errors clustered by field of education increased the standard error of the soft skills variable to the level of 0.018 (compared with 0.013 for OLS), suggesting some positive intracluster correlation. Clustering by economic sectors led to the same results (0.019). In both cases, clustering had no effect on standard errors of the years of schooling variable. Clustering by occupations at 1-digit level of International Standard Classification of Occupations (ISCO classification) increased standard errors of both soft skills (0.032) and years of schooling (0.008 compared to 0.005 of OLS), suggesting significant intercluster homogeneity in levels of both kinds of skills.

9. Although a gross monthly wage was employed as the dependent variable, workload was controlled for only in models containing 'Job characteristics' variables (Models 6, 7 and 12). The approach corresponds to an effort to estimate gross returns to hard and soft skills as they can affect individual's wage indirectly through their impact on the workload. Moreover, it can be expected that an absence of the workload variable in other models has minimal effect on estimated results as part-time jobs are not frequent in the Czech Republic (there was a 93.8% share of full-time workers in the sample).
10. Schooling was measured in effective years, which are defined as 'the number of years nominally required to obtain certain degree' (Groot and Oosterbeek, 1994: 317).
11. See Ministry of Education, Youth and Sports (MEYS, 2011) for more information on the education system in the Czech Republic.
12. The mean number of years of schooling was 13.14 for men and 13.28 for women (the difference was not statistically significant). On the other hand, the gender difference in soft skills (mean level 2.73 for men and 2.87 for women) was statistically significant at the 0.01 level. There were significant differences in the structure of soft skills required from men and women, although the analysis aggregates them into one variable because of their high mutual correlation. Men needed a higher level of creativity, while women needed a higher level of effective communication, consumer orientation, efficiency, planning and organising, life-long learning, proactive approach, exploring and orientation in information, and influencing others. These gender differences were usually small (lower than 0.25 of a behavioural level) except consumer orientation (0.75), effective communication (0.34) and influencing others (0.32). They corresponded to a high share of women among clerks (ISCO 4) and service workers, shop and market sales workers (ISCO 5); 43.86% of women in the sample worked in these occupations compared to 18.36% of men. The level of other soft skills embodied no statistically significant gender differences. This result raises many questions on gender differences in accumulation of particular soft skills and their role in (self-)selection into different occupations and economic sectors. Unfortunately, the dataset used in this article is insufficient to provide answers to these questions.
13. Women were more represented in all sectors with significantly higher returns to soft skills (15.14% of women in the sample were employed in sectors NACE I, K, M and R, but only 10.50% of men), while the situation was the opposite in sectors with significantly lower returns to soft skills (6.43% of women and 10.00% of men were employed in sectors NACE A and H). This contributed to a reduction of gender differences in wage

returns to soft skills, together with higher level of soft skills in the case of women also to closing gender wage gap.

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