

COMPETENCE PROXIMITY TO EMPLOYERS' REQUIREMENTS AND LABOUR MARKET SUCCESS OF ECONOMICS AND BUSINESS GRADUATES

Bruno Škrinjarić

Abstract

This research concentrates on Croatia with threefold aims: (1) to identify and quantify key competences developed by economics-and-business graduates; (2) to assess the degree of proximity between competences acquired at universities and those required on the labour market; and (3) to investigate how this proximity translates labour market outcomes for graduates. This research is based on primary data, collected through two questionnaires, one for graduates and one for firms. Key competences were identified using factor analysis. Proximity between employers-required and graduates-acquired competences were then used as covariates in explaining differences in graduates' employability and wage premiums using standard regression model, Heckman selection model and instrumental variables approach. Results show that university education is highly skewed towards the acquisition of economics-and-business practical competences, while employers put greater emphasis on generic competences. Results also point to a penalty of having a competence gap on graduates' probability of being employed and on their wages.

Keywords: graduates; firms; competences: competence matching; Croatia

JEL classification: J20, J24

1. Introduction

Shorter product life cycles and increased pace of technological change caused many firms to become more market-driven and quicker in their adaptations to new customer needs (Yang, You, and Chen 2005). To achieve that, employers are forced to invest heavily in human capital of their workers to acquire the needed competences. Competences are defined as "individual dispositions to self-organization which include cognitive, affective, volitional and motivational elements; they are basically an interplay of knowledge, capacities and skills, motives and affective dispositions." (Rieckmann 2012, p. 131), transcending simple skills or abilities and encompassing both of those (Škrinjarić 2022). Furthermore, since the cost of developing human capital is increasing, employers expect educational institutions to equip workers with

required competences without additional industry training (Husain et al. 2010). This is also corroborated by the H.E.G.E.S.C.O. report, stating that graduates are expected to be competent in a very broad range of areas, comprising both field-specific and generic skills, as well as technical abilities (Allen and van der Velden

Bruno Škrinjarić, PhD

Research associate

The Institute of Economics, Zagreb

J. F. Kennedy square 7, 10000 Zagreb, Croatia

Country: Croatia

E-mail: bskrinjaric@eizg.hr

ORCID: <https://orcid.org/0000-0002-5969-1948>

2009). Andrews and Higson (2008, p. 419) argue that employers expect "... graduates would be employment-ready; equipped with the necessary skills and competencies, and able to work with the minimum of supervision", thus increasing the emphasis on a match between employers' competence requirements and workers' competence acquisitions. Competence mismatches have negative consequences on individual, firm and macroeconomic level. At individual level, this mismatch reduces job satisfaction and wages (Green and McIntosh 2007; Mavromaras, McGuinness, and Fok 2009); at firm level, it dampens productivity and increases on-the-job training costs (Kampelmann and Rycx 2012); and on macroeconomic level it translates into structural unemployment and hinders growth prospects (Quintini 2011). Furthermore, World Economic Forum (2016) reports that 38% of employers reported having difficulties in filling jobs in 2015 with workers possessing adequate combination of required competences.

Nowadays, the importance of competence alignment became highly evident from the perspective of digital transformation. Digital transformation requires competent workforce capable of effectively leveraging digital technologies and driving organizational change. Competences like digital literacy, data analysis and interpretation, adaptability and continuous learning, cybersecurity and risk management, collaboration and communication play a pivotal role in driving successful digital transformation initiatives (Van Deursen and Van Dijk 2014). The importance of competence alignment has become even more significant from the perspective of the recent COVID-19 pandemic. The pandemic has brought about unprecedented challenges, disruptions, and changes in the workforce and the job market. Competences have played a crucial role in how individuals, organizations, and societies have responded and adapted to the pandemic. Most notably, the pandemic has accelerated the adoption of digital technologies and remote work. Individuals with strong digital competences have been better equipped to navigate virtual work environments, utilize online communication tools, and adapt to new digital platforms (Sá et al. 2021). In addition, competences like problem-solving, flexibility, and emotional intelligence have been crucial in dealing with evolving situations, managing stress, and finding innovative solutions. Competences also play a crucial role in implementing sustainable practices and fostering a successful transition towards a greener and more sustainable economy. Competences in green innovation and technology, like expertise in renewable energy technologies, sustainable transportation, circular economy, and green infrastructure

development, are critical for developing and deploying eco-friendly solutions (UNEP 2016; GSIA 2019).

This research concentrates on economics and business graduates and firms in Croatia and explores the association of competence proximity (mismatch) between those that graduates acquire during their study and those that employers require and labour market outcomes of graduates – their employability and wages. Hence, this research can be considered as a general policy evaluation of curriculum contents as it assesses to what extent are higher educational institution curricula in line with the contemporary needs of labour market. Hence, the main research question is: To what extent does a proximity (mismatch) between competences developed during higher education and those demanded by employers influence graduate employability and their wages?

Issue of competence misalignment is one of the most persistent problems in Croatian economy, further amplified by the financial crisis effects from late 2008 (Galić and Plečaš 2012), and recent COVID-19 pandemics. Croatian labour market is characterized with high costs to labour and wage adjustments and low mobility of workers – both occupationally and geographically. The same holds true for difference in competences, occupations, or different sectors of economic activity. Botrić (2009) argues that increased structural imbalance on Croatian labour market resulted from changes due to fast restructuring and transition process of product market during the 1990s when Croatia broke ties from former socialist system, leading to changes in labour demand which were not followed by changes in labour supply.

The aim of this research is threefold. Firstly, using the data from economics and business graduates, it aims to indicate which competences are mostly developed through their tertiary education process. The results show that tertiary education curricula are highly skewed towards acquisition of economics-and-business practical competences at the expense of equipping graduates with competences of general type. Secondly, research aims to assess the degree of proximity between the competences acquired at universities and those required on the labour market. These results indicate that employers put greater emphasis on general competences instead of economics-and-business practical ones, and hence indicate to a mismatch between competences being taught at universities and those demanded on the labour market. This measure of proximity is assessed in two different ways, taking in account the fact that different individuals may use different yardstick to measure their own competence level. Third and final goal of this paper is to investigate how this proximity affects graduates'

outcomes on the labour market. Results point at a penalty of having a competence gap towards graduates' probability of being employed and on their wages.

This paper contributes to the literature in several ways. First, this research addresses the significance of the competence (mis)match among graduates in relation to their labour market status and wages, an area that has been insufficiently explored. Previous studies on skill or competence mismatch were scarce due to consultants' limited patience for gathering extensive datasets (Kucel, Vilalta-Bufi, and Robert 2011). Moreover, the scarcity of such studies was also attributed to the lack of a sound and clear methodology, particularly concerning the common measurement of competences (Finegold and Notabartolo 2010). Secondly, in contrast to defining competences a priori (Lokshin, Van Gils, and Bauer 2009), this research adopts a different approach by starting with an extensive list of skills and abilities gathered through a literature review. This list was then refined and validated through a pilot study and expert opinions before being grouped into competences. By doing so, respondents had no prior knowledge of which skills and abilities would be associated with specific competences, thus effectively reducing potential biases towards certain types of competence. Lastly, the study focuses on Croatia, which provides an ideal laboratory setting for investigating competence-related topics due to its high labour costs and wage inflexibility. The rigid labour market conditions and low rates of on-the-job training (approximately 25%, as reported by Eurofound (2017)) suggest relatively stable competences within the labour force, aligning well with the methodology employed to examine their relationship with firm performance.

The rest of the paper is organized as follows. The next section explains how this study builds on prior research that has examined investigation into key competences and their (mis)match. Section 3 presents data and methodology used. In section 4, the key results of the analyses are presented. The last section contains summary of the main conclusions and discusses potential directions for future research.

2. Literature review

Study and identification of key competences is relevant to both employers and workers as their synchronization would reduce the mismatch on the labour market and increase general welfare. This study is founded upon the Human Capital theory, elucidating how individuals interpret cues from organizations to

yield economically advantageous outcomes for themselves. According to this theory, individuals make deliberate choices regarding their education, experiences, and efforts to gather information (Becker 1962). Choices that offer substantial returns on investment, such as advanced education and work experiences, amplify an individual's human capital by enhancing productivity and earning potential. Knowledge about the prerequisites for securing a job in a specific occupation such as required set of competences holds significance, as it guides individuals' investment choices towards those that are likely to yield the highest returns in terms of employability and wages.

2.1. Competences and graduates' employability

Competences play a crucial role in graduates' employability. Numerous studies have shown that a strong set of competences is associated to higher graduate employability. These skills are often acquired through specialized courses, practical experiences, or research projects during their academic journey. Robles (2012) shows that graduates who possess strong interpersonal and communication abilities tend to excel in job interviews and perform well in the workplace. Leadership abilities and teamwork skills are essential for career advancement and overall job performance. Zhao, Seibert, and Hills (2005) show that graduates who can work collaboratively, inspire others, and take on leadership roles are more likely to be considered for higher-level positions. Andrews and Higson (2008) analyse graduate and employer perspectives of graduate employability in four European countries (UK, Austria, Slovenia, and Romania), and conclude that to increase graduate employability, business schools need to make sure their graduates are equipped with more than hard business-focused competences. Obadić (2006a, 2006b) investigates the problem of mismatch between the demand on the labour market and the location of workers seeking employment, on a regional level for Czech Republic, Croatia, Poland, Slovakia and Slovenia. Results point towards the existence of this mismatch in Czech Republic, Croatia and Slovakia and towards decrease in total employment with an increase in mismatch indicator. Nicolescu and Paun (2009) worked with Romanian data to identify the extent to which graduates' expectations in terms of competences developed through higher education are convergent to employers' requirements. They found that graduates emphasize the most on getting practical competences while employers emphasize the most on moral and psychic qualities of the

individual (general competences). Tomić (2014) studies mismatch on Croatian labour market via matching function and finds that although occupational mismatch does not have an impact on the aggregate flow of filled vacancies, 6% of total unemployment that can be attributed to occupational mismatch. Bailey and Ingimundardottir (2015) explore the effects of students taking a free extra-curricular competence development program on their subsequent employability estimates and find positive associations. Van Der Heijde and Van Der Heijden (2006) perform a similar study in one Dutch firm, where they propose a competence-based model to measure employability based on a five-dimensional conceptualization complemented with specific and generic competences, which is found to be positively associated with both individual careers and firm outcomes.

In summary, competences are directly connected to graduate employability. As presented above, previous research shows that a combination of both occupation-specific competences and general competences, such as job-specific skills, soft skills, adaptability, problem-solving, critical thinking, leadership, and teamwork makes graduates more attractive to employers and enhances their chances of securing employment. However, a slight importance advantage is given to practical occupation-specific competences when it comes to hiring decision. Lau et al. (2014) show that graduates with well-developed practical and technical competences related to their field of study are more likely to secure employment in their chosen profession. Durrani and Tariq (2012) highlight the potential for poor numeracy competences to limit graduate's acquisition of employment, irrespective of their degree subject. This is especially true for economics and business graduates, where numeracy competences are predominantly used in recruitment tests. Thus, the following hypothesis is offered:

H.1: Graduates with greater proximity (lower mismatch) between *occupation-specific practical competences* acquired during higher education and those demanded on labour market are more likely to be employed.

2.2. Competences and graduates' wage premiums

Competences have a significant impact on the wages of graduates. The acquisition of specific skills, knowledge, and attributes during higher education can lead to increased earning potential in the job market.

Allen and Van der Velden (2001) investigated

mismatch impacts on labour market outcomes of Dutch graduates. They exploited the Higher Education and Graduate Employment in Europe database, specifically the cohort who graduated in 1991, and studied their labour market situation seven years later. Competence mismatches were found to be present among half of the graduates and were found to be associated with a 6% decrease in wages and a 14% decrease in job satisfaction. Mavromaras, McGuinness, and Fok (2009) performed a similar study in Australia using Household, Income and Labour Dynamics survey and found that about 11.5% of working age employees in full-time employment were severely over-skilled and paid less, on average, than their equally skilled, well-matched counterparts. Green and McIntosh (2007) studied competence mismatch in Britain using the second Skill Survey conducted in 2001 and showed that 35% of UK employees were over-skilled and 13% were under-skilled, both of which negatively affected their wages, by 9.9 and 0.6 percent respectively. Fredriksson, Hensyik, and Skans (2018) examine the direct impact of mismatch on wages in Sweden by comparing the competences of recently hired workers to the competences of incumbent workers performing the same job and indicate a 13% reduction in wages due to competences mismatch. García-Aracil and Van der Velden (2008) use a Careers after Higher Education – A European Research Survey (CHEERS) data to estimate monetary rewards of higher education graduates. This study indicated at heterogeneity between different competence requirements, where jobs with higher participative and methodological competence requirements are better paid (by 4% to 6%). Yamaguchi (2012) and Postel-Vinay and Lise (2015) investigate effect of mismatches in cognitive, manual, and interpersonal competences and suggest that cognitive competences have much higher return than manual competences but are slower to adjust to market requirements, while interpersonal competences have moderate returns but are slow to adjust over a worker's lifetime. They also found that the cost of mismatch is the highest for cognitive competences in relation to two other competences, but also asymmetric: employing a worker who is under-qualified in cognitive competences is costlier than employing an over-qualified worker.

In conclusion, competences have a direct impact on the wages of graduates. The acquisition of specialized, occupation-specific competences, soft skills, problem-solving abilities, continuous learning, and leadership skills all contribute to graduates' earning potential in the job market. Hence, the following hypothesis is offered:

H.2: Graduates with greater proximity (lower mismatch) between competences acquired during higher education and those demanded on labour market receive higher wage returns.

This short literature review outlines that there is still no general agreement about the best competence set for ensuring labour market success. Concentrating more on former south-east European transition countries (like Croatia), studies on skill, competence, or occupational mismatch are scarce mainly due to lack of adequate data, different approaches in defining, measuring, and comparing competences, and the fact that some competences are non-transferable among different industries. This research hopes to contribute to development of that topic.

3. Methodology and data description

3.1. Theoretical framework

Assume there are n graduates and C competences. Building on Rieckman's (2012) definition of competences as an interplay of skill and abilities, this study considers competences to be latent variables measured using the observable indicators – the skill and ability items. By the end of their studies each graduate i , $i \in \{1, 2, \dots, n\}$ develops each competence c , $c \in \{1, 2, \dots, C\}$, which in total determines their competence inventory, $C_i = \{c_{i1}, c_{i2}, \dots, c_{ic}\}$. Asfani, Suswanto, and Wibawa (2016) provide a good summary of factors influencing development of competences among students. A mix of these factors results in graduates with different competence inventories.

On the other side, firms wish to employ graduates that best suit their competence requirements. Assume that firms reached a consensus about the optimal competence development inventory, $C^* = \{c_1^*, c_2^*, \dots, c_c^*\}$, ensuring the highest probability of being a productive worker. Note that C_{ic} represents the graduate i 's acquired level of competence c , and c_c^* represents the optimal required level of that same competence by employers. Hence, from a firm's point of view, the expected productivity of graduates depends, among other factors, on the proximity of the graduate's set of acquired competences C_i to the mix of optimal competences C^* .

This competence proximity is measured in three ways. First measure involves defining a mismatch/gap, G_i , between C_i and C^* (lower values indicate greater proximity):

$$G_i = \sum_{c=1}^C |c_{ic} - c_c^*|, \quad \forall i, i \in \{1, 2, \dots, n\} \quad (1)$$

Since these mismatches (gaps) have no measurement unit, they are transformed in their standardized form (in units of standard deviations) and are hence interpreted as standard unit deviations from their average values.

However, this self-reported competence development/requirement may suffer from non-objectivity of the person evaluating them. As highlighted in Teijeiro, Rungo, and Freire (2013), different individuals may have different response styles and may use a different yardstick to measure their own competence development/requirement. One way of alleviating this issue is to use a rank order of competence development/requirement, as this ordering indicates which competences have been developed/required the most (giving the highest value to the highest developed/required competence), independently from the actual developed/required level. Hence, second way of measuring competence proximity is by obtaining a ranking vector of optimal competence requirements, C^* , and compare it with ranking vector of competence development for each graduate, C_i . Let $R_i = \{r_{i1}, r_{i2}, \dots, r_{ic-1}, r_{ic}\}$ and $R^* = \{r_1^*, r_2^*, \dots, r_{c-1}^*, r_c^*\}$ be the ranking vectors of graduate i and consensus of all firms, respectively, where r_{ic} and r_c^* represent the ranks assigned to competence c . A proximity parameter p ($p \geq 0$) serves as a measure of equivalence between r_{ic} and r_c^* : $p_i = |r_{ic} - r_c^*|$. $p = 0$ (strong equivalence) implies that employers' requirement ranking of competence c is identical to graduates' development ranking of that same competence. However, since this is seldom the case, employers often hire workers with their competence development ranking being "as close as it can be" to suit firm's needs. In this sense, $p > 0$ (weak equivalence) entails a situation where ranks given to a particular competence c are considered "approximately the same" (different values of proximity parameter p will be used in robustness check). Using this proximity parameter, variables P_{ic} and $PROX_i$ are defined (higher values of variable $PROX$ indicate higher proximity):

$$P_{ic} = \begin{cases} 1, & \text{when } |r_{ic} - r_c^*| \leq \rho \\ 0, & \text{when } |r_{ic} - r_c^*| > \rho \end{cases} \quad (2)$$

$$PROX_i = \sum_{c=1}^C P_{ic} \quad (3)$$

Third approach to measuring competence proximity is by measuring the distance ($DIST$) between ranking vectors of each graduates' competence inventory development and a consensus of firms' competence requirements (higher values of variable $DIST$ indicate lower proximity):

$$DIST_i = \sum_{c=1}^C |r_{ci} - r_c^*| \quad (4)$$

First measure of proximity, G , will be used for main set of results, and the two remaining measures of proximity, $PROX$ and $DIST$, will be used in robustness check section.

Presented theoretical framework most closely resembles that of Teijeiro, Rungo, and Freire (2013) and Gawrycka, Kujawska, and Tomczak (2020). A former study investigates impact of matching firms' needs and personal attainments of graduate competencies and employability in Spain, while the latter study examines and compares the views of employers and future employees on the desirable competencies of the potential labour market participants in Poland. Both studies collect the data for competence importance from employers (or recruiters) and data for competence development from graduates. This study focuses on Croatia, and presents a different setting compared to large economies of Spain and Poland. Following the two quoted papers, this study also concentrates on business and economics graduates and uses a data gathering process from employers and from graduates (future employees) to assess the relative importance and development of different competences. Compared to two quoted papers, this study expands the list of skills and abilities sent for evaluation which are then combined into key competences, it captures both firms and graduates from different parts of Croatia, as opposed to only one region or one university, and it increases the number of firms and graduates used on analysis.

3.2. Empirical methodology

Impact of competence proximity (gap) on graduates' employability is empirically investigated using a Probit model:

$$Pr(E_i = 1|X) = \Phi([GX]'\beta) \quad (5)$$

where E_i indicates labour market status of graduate i (employed or unemployed), G is a matrix of competence gaps, X is a matrix of other socio-economic graduates' characteristics, Φ is a standard normal cumulative distribution function, and β is a vector of parameters to be estimated. Matrix X contains personal information (age, sex, region, type of settlement, marital status), household information (number of household residents, total household income, number of cars owned by household) and educational information other than years of schooling (foreign education,

GPA at graduation, student status, HE institution ownership type and whether student worked during studies). Graduates with low competence gap (high competence proximity) are expected to have higher probability of being employed.

Impact of competence proximity (gap) on graduates' wages is empirically investigated using an augmented Mincerian model (Mincer 1974):

$$\ln W_i = \beta_0 + \beta_1 SCH_i + \sum_{c=1}^C \gamma_c G_{ic} + \sum_{c=1}^C \gamma_c G_{ic} + \sum_{k=1}^K \delta_k X_{ik} + \varepsilon_i \quad (6)$$

where W_i represents (ln) monthly wage of individual i , SCH represents educational attainment measured in number of years of schooling, G_{ci} is a measure of proximity between firms' required and graduates' acquired competence inventories for c^{th} competences, X_{ki} is the value of k^{th} explanatory variable for i^{th} individual and ε_i is error term of the model assumed to follow normal distribution with zero mean and a constant variance. Matrix X contains all the variables as in Equation 5, amended with labour market information (total work experience, employers' ownership type, employers' size, workers position within firm and total duration of training received at work). Graduates with low competence gap (higher competence proximity) are expected to be more productive and awarded a higher salary (Kelly, O'Connell, and Smyth 2010).

However, simple OLS estimation may suffer from bias caused by endogeneity and self-selection of graduates to employment (Card 2001). In terms of endogeneity, graduates' ability can be seen as a determinant of both wages and acquired competences (and thus competence proximity), i.e., abler graduates tend to grasp certain competences easier and with less effort, and also abler graduates tend to be more productive at their workplace and hence better paid. This problem is tackled using instrumental variables two-stage least squares (2SLS) estimation method. In this research, due to availability of data, possible variables set to be used as instruments include graduates' mother and father highest obtained education level. More educated families provide education-friendly environment and/or greater financial aid for their children during their schooling process, which would lead to better guess about the competence requirements on the current labour market and greater help in their children's acquisition of those competences. Self-selection bias arises due to non-random selection of the sample (sub-population) used in analysis, where

the differences in characteristics observed in individuals may simply be due to sample selection problem. This is addressed using Heckman (1979) sample selection model.

3.3. Project design and data description

3.3.1. Data collection from firms

Firm dataset consists of primary data collected through questionnaire, amended with firm financial and characteristics data from Croatian Financial agency (FINA). Questionnaire was developed by the author from previous similar research (Biesma et al. 2007; Biesma et al. 2008; Kelly, O'Connell, and Smyth 2010) and pilot study results. A final list of 58 general and practical skills and abilities was sent out for self-evaluation. The former set includes higher cognitive (e.g., learning abilities, analytical skills, problem-solving abilities) and interpersonal (e.g., team working skills, planning, and organizing skills and decision-making skills) skills and abilities, while the latter set includes theoretical knowledge as well as methods and procedures specific to economics and business domain (e.g., writing business letters, compiling financial reports, calculating costs and budgets, etc.). The number of skill/ability items sent for self-evaluation in other similar studies ranges from 34 (Biesma et al. 2008) all the way to 99 (Chung-Herrera, Enz, and Lankau 2003). While acknowledging the problems associated with self-evaluation, given the available time and resources, this turned out to be the most appropriate

and practical. Literature also supports this method of assessment (Watson et al. 2002) and suggest that continual self-assessment will provide the opportunity to reflect on their practice and to request resources to address perceived deficits (Waddell 2001).

Questionnaire was administered in online version from April to July 2016. In addition to providing basic firm information, respondents (firm owners, CEOs, or heads of HR department) were asked to rate how important each skill or ability is for positions occupied by employees with business and economics background on a five-point Likert scale ranging from 1 (unimportant) to 5 (extremely important).

Following and adapting sampling strategy from lootty et al. (2014), final questionnaire (representative in terms of firm size, NACE one-digit industry and Croatian counties) was sent out to 1,000 Croatian companies. 156 responses came back, giving a 15.6% completion rate which is quite standard, given that response rates in similar studies range from 11% (Azevedo, Apfelthaler, and Hurst 2012) to 18.6% (Chung-Herrera, Enz, and Lankau 2003). Following a data cleaning process, sample was reduced to 112 firms. Somewhat low number of respondents is also quite standard in this type of study. For example, Chiru et al. (2012) analyse tourism and agricultural industry using data from 44 firms, Zehrer and Mossenlechner (2009) base their analysis of tourism sector on 48 firms and Pan and Perera (2012) assess the competences in accounting field using 106 firms' responses. Table 1 shows descriptive statistics of sampled firm characteristics.

Table 1. Descriptive statistics of firms in the sample

| Variable | Questionnaire respondents | | All firms in 2016 | |
|----------------------------|---------------------------|------|-------------------|------|
| | <i>n</i> | Mean | <i>N</i> | Mean |
| <i>Size</i> | | | | |
| Micro | 35 | 0.31 | 85,171 | 0.89 |
| Small | 47 | 0.42 | 9,160 | 0.10 |
| Medium | 21 | 0.19 | 1,515 | 0.02 |
| Large | 9 | 0.08 | 313 | 0.00 |
| <i>Region^b</i> | | | | |
| Central Croatia | 43 | 0.38 | 42,711 | 0.44 |
| North-western Croatia | 19 | 0.17 | 8,757 | 0.09 |
| East Croatia | 16 | 0.14 | 8,741 | 0.09 |
| North Adriatic and Lika | 21 | 0.19 | 17,176 | 0.18 |
| Central and South Adriatic | 13 | 0.12 | 18,774 | 0.20 |

Table 1. Continued

| | | | | |
|--|-----|-------|--------|------|
| <i>Ownership</i> | | | | |
| State | 14 | 0.13 | 787 | 0.01 |
| Private | 95 | 0.85 | 94,210 | 0.98 |
| Mixed | 3 | 0.03 | 1,162 | 0.01 |
| <i>Exporter</i> | | | | |
| Exporter | 53 | 0.47 | 13,931 | 0.14 |
| Non exporter | 59 | 0.53 | 82,228 | 0.86 |
| <i>Industry sector</i> | | | | |
| Agric., forestry, fishing | 1 | 0.01 | 2,709 | 0.03 |
| Manufacturing | 48 | 0.43 | 12,355 | 0.13 |
| Construction | 7 | 0.06 | 10,451 | 0.11 |
| Services | 56 | 0.50 | 70,644 | 0.73 |
| <i>Financial variables (in real terms)</i> | | | | |
| Number of employees | 112 | 89.23 | 96,159 | 7.51 |
| Capital (mil. HRK) ^a | 112 | 47.89 | 96,159 | 1.77 |
| Value added (mil. HRK) ^a | 112 | 25.87 | 96,159 | 2.68 |
| Turnover (mil. HRK) ^a | 112 | 35.21 | 96,159 | 3.19 |

Notes: ^a All monetary values are expressed in Croatian kuna (HRK), 1 EUR = 7.529 HRK (2016 average). ^b Information about definitions of regions is available on request.

Source: Authors calculations based on questionnaire and FINA data.

3.3.2. Data collection from graduates

This dataset consists of primary data collected through questionnaire from economics and business graduates. These particular graduates were chosen for several reasons: (1) following the financial crisis of 2008, Obadić and Majić (2013) report that about every third higher education graduate (25 to 29 years) did not have a secured job position, particularly those with economics-and-business background; (2) graduates' competences were not yet influenced by tenure nor have become obsolete, thus enabling estimation of how do the universities prepare them for challenges on the labour market; and (3) economics-and-business graduates' competences, both general and practical, are not tied to a certain industry as they are needed across wide range of sectors and between different departments within each enterprise.

List of all the higher education (HE) institutions that provide economics and business programs (obtained from Ministry of Science and Education, hereafter MSE) was combined with Croatian Bureau of Statistics (CBS) data, who publish the number of graduates from those institutions on yearly basis. Unfortunately, CBS does not provide data on specific study programs, which prompted exclusion from analysis of graduates from HE institutions that provide programs not related to economics and business (e.g.,

Faculty of Organization and Informatics in Varaždin offers both informatics and economics programs, but as there was no way to differentiate between these two graduates, they were excluded from analysis).

To ensure consistency and comparability of responses between firms and graduates, this questionnaire used the same list of skills and abilities as the one sent out to firms, where graduates had to evaluate their development level in each of given skill or ability during their studies. Other sections of questionnaire were accommodated to collect their personal and socio-economic data. On-line version was sent to a sample of 10,000 economics and business graduates. This graduate sample was representative in terms of type of higher educational institution (Schools of professional higher education, Polytechnics and Faculties), types of studies (professional and university studies) and by higher education institutions themselves. Invitations were sent out to 736 graduates from Schools of professional higher education and Polytechnics, and to 9,264 graduates from Faculties, thus capturing 28.9% and 30.1% of both graduates, respectively. This questionnaire was implemented from April to July 2016 and it recorded a return rate of just over 10%, with 1,009 ready-to-use observations. Table 2 and Table 6 in Appendix show the final distribution of collected data from graduates.

Table 2. Descriptive statistics of information collected from graduates

| Variable | N | Mean | S. d. | Min | Max |
|---------------------------------|-------|--------|-------|-------|--------|
| <i>Personal information</i> | | | | | |
| Age | 1,009 | 28.09 | 1.05 | 27 | 32 |
| Gender | | | | | |
| Male | 444 | 0.44 | 0.50 | 0 | 1 |
| Female | 565 | 0.56 | 0.52 | 0 | 1 |
| Region | | | | | |
| Central Croatia | 727 | 0.72 | 0.45 | 0 | 1 |
| North-western Croatia | 91 | 0.09 | 0.29 | 0 | 1 |
| East Croatia | 101 | 0.10 | 0.30 | 0 | 1 |
| North Adriatic and Lika | 50 | 0.05 | 0.23 | 0 | 1 |
| Central and South Adriatic | 40 | 0.04 | 0.19 | 0 | 1 |
| Living in urban settlement | 707 | 0.70 | 0.46 | 0 | 1 |
| Married | 424 | 0.42 | 0.49 | 0 | 1 |
| <i>Household information</i> | | | | | |
| Members of household | 1,009 | 2.99 | 1.04 | 1 | 5 |
| Household income | 1,009 | 14,335 | 5,359 | 2,300 | 29,650 |
| Cars owned by household | 1,009 | 1.54 | 0.77 | 0 | 4 |
| Father highest education level | | | | | |
| Elementary | 151 | 0.15 | 0.35 | 0 | 1 |
| Secondary | 454 | 0.45 | 0.50 | 0 | 1 |
| Tertiary | 404 | 0.40 | 0.49 | 0 | 1 |
| Mother highest education level | | | | | |
| Elementary | 172 | 0.17 | 0.38 | 0 | 1 |
| Secondary | 464 | 0.46 | 0.50 | 0 | 1 |
| Tertiary | 373 | 0.37 | 0.48 | 0 | 1 |
| <i>Education information</i> | | | | | |
| Years of education | 1,009 | 17.32 | 0.98 | 15 | 20 |
| Foreign education | 1,009 | 0.23 | 0.42 | 0 | 1 |
| Graduation GPA ^a | 1,009 | 4.26 | 0.59 | 2.9 | 5 |
| Student status | | | | | |
| Full-time student | 636 | 0.63 | 0.48 | 0 | 1 |
| Part-time student | 373 | 0.37 | 0.28 | 0 | 1 |
| Education institution ownership | | | | | |
| Private institution | 161 | 0.16 | 0.37 | 0 | 1 |
| Public institution | 848 | 0.84 | 0.37 | 0 | 1 |
| Work during HE studies | 1,009 | 0.48 | 0.50 | 0 | 1 |
| <i>Labor market information</i> | | | | | |
| Unemployed | 361 | 0.36 | 0.21 | 0 | 1 |
| Employed | 648 | 0.64 | 0.48 | 0 | 1 |
| Work experience | 648 | 1.91 | 0.81 | 0 | 5 |
| Employer ownership | | | | | |
| Private | 434 | 0.67 | 0.47 | 0 | 1 |
| State | 214 | 0.33 | 0.27 | 0 | 1 |

Table 2. Continued

| | | | | | |
|-------------------|-----|-------|-------|-------|--------|
| Employer size | | | | | |
| Micro firm | 91 | 0.14 | 0.35 | 0 | 1 |
| Small firm | 214 | 0.33 | 0.47 | 0 | 1 |
| Medium firm | 259 | 0.40 | 0.49 | 0 | 1 |
| Large firm | 84 | 0.13 | 0.34 | 0 | 1 |
| Employee status | | | | | |
| Owner | 65 | 0.10 | 0.30 | 0 | 1 |
| Manager | 168 | 0.26 | 0.44 | 0 | 1 |
| Worker | 415 | 0.64 | 0.48 | 0 | 1 |
| Training at work | 648 | 0.55 | 0.50 | 0 | 1 |
| Wage ^b | 648 | 6,040 | 1,421 | 2,550 | 12,000 |

Notes: ^a Grades in Croatian educational system range from 1 (fail) to 5 (excellent). ^b To increase the response rate, when asking for the amount of household income and wage, respondents were asked to round a number to nearest 50 HRK or 100 HRK. 1 EUR = 7.529 HRK (2016 average).

Source: Authors calculations based on questionnaire.

4. Findings and discussion

4.1. Estimation of key competences

Key competences were identified using exploratory factor analysis on firm dataset (as firms are the ones creating demand on labour market). Using standard criteria of eigenvalue greater than one and based on the list of skills/abilities loadings on each factor, eight key competences (factors) were extracted, explaining over 80% of original variance: 1) economics-and-business theory and practice; 2) collectedness, presentation, and teamwork; 3) IT proficiency; 4) business communication; 5) project management and professionalism; 6) advocacy, language fluency; 7) motivation and organization; and 8) quantitative-economics algebra. All these competences are concerning respondents themselves, i.e., *motivation and organization* means that graduates themselves are motivated and organized, and not that they have ability to motivate and organize others. This division is in line with previous studies that have focused on a small set of key competences (Biesma et al. 2008; Azevedo, Apfelthaler, and Hurst 2012; Grzybowska and Łupicka 2017). Kaiser-Meyer-Olkin sampling adequacy measure of 0.88 justifies the usage of exploratory factor analysis. Competences 1, 3, 4 and 8 were labelled as economics-and-business practical competences, while competences 2, 5, 6 and 7 were labelled as general. Confirmatory factor analysis with a root mean squared error of approximation of 0.062 indicates a good fit of the model.

To quantify key competences, a sum score of all its items was calculated and divided by the total number

of items per each competence. Competences employers view as the most important are *motivation and organization, project management and professionalism* and *collectedness, presentation, and teamwork* (Table 3). On the other hand, graduates felt the most confident in acquisition of the *quantitative-economics algebra, business communication* and *economics-and-business theory and practice* competences. Key competences' requirements were also calculated by different industries, firm size, firm ownership and by different educational attainment of firm representatives and find no significant differences within these groups were found.

Differences between required and acquired competences are presented in last column of Table 3, presenting competence proximity from employers' point of view – a positive sign indicates competence overdevelopment while a negative sign indicates competence shortage. Practical competences are mostly in excess development (apart from *business communication* competence) while those of general type are in shortage, with the greatest shortage in *motivation and organization* and *project management and professionalism* competences. These results are in line with previous research suggesting that employers place greater emphasis on general competences such as professionalism, project management and teamwork (Biesma et al. 2008; Azevedo, Apfelthaler, and Hurst 2012; Chiru et al. 2012; Grzybowska and Łupicka 2017) whole HE institutions are more concerned with equipping graduates with practical competences (Chiru et al. 2012). Of course, one could argue this is their primary role. However, it is important to note that

Table 3. Descriptive statistics of key competences by firms and graduates

| | | Required by firms | Acquired by graduates | Mean diff. |
|--------------------------------------|--|-------------------|-----------------------|----------------|
| | | Mean (S. d.) | Mean (S. d.) | |
| Practical | Economics and business theory and practice | 3.6 (0.9) | 4.0 (0.4) | 0.3*** |
| | IT proficiency | 3.0 (1.0) | 3.2 (0.9) | 0.2** |
| | Business communication | 4.3 (0.7) | 4.0 (0.5) | -0.3*** |
| | Quantitative-economics algebra | 3.7 (1.1) | 4.1 (0.8) | 0.4*** |
| Practical competences (total) | | 3.6 (0.8) | 3.8 (0.4) | 0.2*** |
| General | Collectedness, presentation, and teamwork | 4.2 (0.6) | 3.7 (0.8) | -0.5*** |
| | Project management and professionalism | 4.4 (0.6) | 3.6 (0.8) | -0.9*** |
| | Advocacy, language fluency | 3.9 (0.7) | 3.6 (0.7) | -0.3*** |
| | Motivation and organization | 4.6 (0.4) | 3.6 (1.0) | -0.9*** |
| General competences (total) | | 4.2 (0.5) | 3.6 (0.7) | -0.6*** |

Notes: Means were calculated as simple means with no weights. Differences in the last column were tested using t-tests for unpaired data with unequal variance. (***) and (**) denote 1% and 5% level of significance, respectively.

Source: Authors calculations based on questionnaire data.

practical competences may become obsolete, or at least outdated, as technological development progresses (World Economic Forum 2016). Instead, future labour market demands that graduates be equipped with competences enabling quick adaptation to latest methods of doing business available on the market. This rather simple analysis points to a high degree of competence mismatch (low competence proximity) on the labour market, especially in terms of general competences.

4.2. Graduates' employability

Table 4 shows the estimation results of employability model presented in Equation 5. First two columns present Probit estimation results – column (1) presents the results when this mismatch is calculated for all 58 skill/ability-items together (without combining them into key competences) and column (2) presents results when these skill/ability-items are grouped in competences.

When looking at results for all skill/ability items together (without combining them into competences), increase in mismatch by one standard deviation from the mean reduces the probability of being employed by 4.9% on average. Now focusing on the situation when these skill/ability items are combined into key competences, results show that only practical occupation-specific competences are significantly associated to probability of being employed. Concentrating on these practical occupation-specific competences,

unit mismatch increase in *economics-and-business theory and practice* reduces the probability of being employed by 5.7% on average, and unit mismatch increase in *business communication* by 3.4% on average. No other key competences, practical or general, seem to be statistically significant in relation to graduates' employability. Nevertheless, they all have the expected negative direction of effect, thus, estimated coefficients could still be consistent with the expectations but due to small dataset, the degree of variation is not sufficient to guarantee statistical significance (Amrhein, Greenland, and McShane 2019). Hence, these results go in favour of supporting H.1.

Endogeneity of acquired graduates' competences and hence the calculated proximity (or in this case mismatch) to employers' requirements is tackled using instrumental variable approach. Due to availability of only two instruments (mothers' and fathers' education), this exercise can only be performed on a single endogenous variable – mismatch in all skill/ability-items – instead on a set of eight key competences, as that would require availability of at least eight good instruments. With this in mind, 1st stage results of 2SLS estimation, presented in column (1) of Table 7 in Appendix, reveal that education of both graduates' parents is negatively associated with mismatch in skills/abilities. For example, providing that graduates' father and mother have obtained secondary education degree, graduates' mismatch in required skills/abilities is expected to be reduced on average by 0.840 and 0.886 standard deviation units, respectively. These results go along in showing that parents'

Table 4. Results of employability model.

| Regressors ^a | | Probit | | 2SLS (2 nd stage) |
|--|--|----------|-----------|------------------------------|
| | | (1) | (2) | (3) |
| Mismatch in all skill/ability items | | -0.049* | | -0.019* |
| | | (0.026) | | (0.009) |
| Mismatch in practical competences | Economics and business theory and practice | | -0.057*** | |
| | | | (0.019) | |
| | IT proficiency | | -0.004 | |
| | | | (0.017) | |
| | Business communication | | -0.034** | |
| | | | (0.015) | |
| | Quantitative-economics algebra | | -0.020 | |
| | | | (0.019) | |
| Mismatch in general competences | Collectedness, presentation, and teamwork | | -0.007 | |
| | | | (0.018) | |
| | Project management and professionalism | | -0.026 | |
| | | | (0.030) | |
| | Advocacy, language fluency | | -0.014 | |
| | | | (0.021) | |
| | Motivation and organization | | -0.005 | |
| | | | (0.016) | |
| N | | 1009 | 1009 | 1009 |
| Pseudo R ² | | 0.735 | 0.753 | 0.732 |
| Sargan score | | | | 6.584 |
| % of correctly predicted | | 93.62% | 94.33% | |
| Hosmer-Lemeshow χ^2 | | 36.26*** | 55.29*** | |
| Area under ROC curve | | 0.9820 | 0.9840 | |

Notes: (***), (**) and (*) denote 1%, 5% and 10% level of significance, respectively. Standard errors in parentheses. Results in columns (1) – (3) are *average marginal effects* while results of *marginal effects estimated at the means* are available on request.

^a All three models also included personal characteristics, household characteristics and education characteristics of a graduate. Personal characteristics variables: age, sex, region, type of settlement, marital status. Household characteristics variables: number of household residents, total household income, number of cars owned by household. Education characteristics variables: foreign education, GPA at graduation, student status, HE institution ownership type and whether student worked during studies. Estimated coefficients of personal, household and education variables are not reported as they were not the focus of the research and due to presentation purposes but are available on request.

Source: Author's calculations based on questionnaire and FINA data.

education level matters and that highly educated parents are better able to point their children in the right direction when it comes to acquisition of skills/abilities required on contemporary labour market. Overall effect of mismatch in all skills/abilities on graduate employability is 1.9% on average (column (3) of Table 4), which is about 3 percentage points lower than OLS estimates.

4.3. Graduates' wage premiums

Table 5 shows the estimation results of augmented Mincerian wage model. First two columns present OLS estimation results – column (1) present the results when mismatch is calculated for all skill/ability

items together and column (2) when these skill/ability items are grouped in key competences. Results for mismatch in all skill/ability items together indicate a wage penalty of about 3.9%. As the average wage in obtained sample amounts to 6,040 HRK (~ 801 EUR), this represents a wage penalty of 235 HRK (~ 32 EUR).

When we focus on economics-and-business practical key competences, results are suggesting a small wage penalty for *economics and business theory and practice* competence mismatch of about 1.1% (67 HRK ~ 9 EUR). This is in line with previous research showing that graduates who possess specialized technical competences and expertise relevant to their field are often rewarded with higher wages (Hershbein and Kahn 2018). These competences differentiate them

Table 5. Results of augmented Mincerian wage model

| Regressors ^a | | OLS | | 2SLS (2 nd stage) | Heckman | |
|--|--|----------------------|----------------------|------------------------------|----------------------|----------------------|
| | | (1) | (2) | (3) | (4) | (5) |
| Mismatch in all skill/ability items | | -0.039*** (0.007) | | -0.131*** (0.033) | -0.048*** (0.008) | |
| Mismatch in practical competences | Economics and business theory and practice | | -0.011** (0.005) | | | -0.017*** (0.005) |
| | IT proficiency | | -0.005 (0.004) | | | -0.003 (0.005) |
| | Business communication | | -0.001 (0.004) | | | -0.003 (0.004) |
| | Quantitative-economics algebra | | -0.003 (0.004) | | | -0.002 (0.004) |
| Mismatch in general competences | Collectedness, presentation, and teamwork | | -0.012 (0.008) | | | -0.014* (0.008) |
| | Project management and professionalism | | -0.012** (0.005) | | | -0.013** (0.006) |
| | Advocacy, language fluency | | -0.003 (0.005) | | | -0.000 (0.005) |
| | Motivation and organization | | -0.020*** (0.006) | | | -0.019*** (0.007) |
| Lambda (Inverse Mill's Ratio) | | | | | 0.091 (0.079) | 0.092 (0.074) |
| <i>N</i> | | 648 | 648 | 648 | 648 | 648 |
| <i>R</i> ² | | 0.891 | 0.892 | 0.847 | | |
| Adjusted <i>R</i> ² | | 0.885 | 0.885 | 0.839 | | |
| Sargan score | | | | 7.159 | | |
| Kleibergen-Paap rk LM statistic | | | | 18.721 | | |
| Kleibergen-Paap rk Wald statistic | | | | 21.552 | | |
| Kleibergen-Paap rk Wald F statistic | | | | 5.082 | | |
| Hansen J statistic | | | | 5.022 | | |
| <i>p</i> | | | | | 0.972 | 1.000 |
| <i>σ</i> | | | | | 0.094 | 0.092 |

Notes: (***), (**) and (*) denote 1%, 5% and 10% level of significance, respectively. Standard errors in parentheses. ^a All five models also included personal characteristics, household characteristics, education characteristics and labor market characteristics of a graduate. Personal characteristics variables: age, sex, region, type of settlement, marital status. Household characteristics variables: number of household residents, total household income, number of cars owned by household. Education characteristics variables: foreign education, GPA at graduation, student status, HE institution ownership type and whether student worked during studies. Labor market characteristics variables: total work experience, employers' ownership type, employers' size, workers position within firm and total duration of training received at work. Estimated coefficients of personal, household, education and labor market variables are not reported as they were not the focus of the research and due to presentation purposes but are available on request.

Source: Authors' calculations based on questionnaire and FINA data.

from other candidates and make them more valuable to employers.

While practical competences are important, general competences such as project management, motivation and organization also contribute to higher wages. Mismatch in general competences indicates a wage penalty of 1.2% (73 HRK ~ 10 EUR) in case of

project management and professionalism competence and 2.0% (120 HRK ~ 17 EUR) in case of *motivation and organization* competence. These results are in line with previous results that employers put more emphasis on general type of competences, and that mismatches in those have greater effect on the wages. Graduates who develop project management competences

often progress into supervisory or managerial roles. These positions are typically associated with higher wages due to increased responsibilities and the ability to guide teams toward success. Additionally, graduates with strong professionalism competences can often negotiate better compensation packages due to their ability to work effectively with colleagues and clients. Competences related to motivation for continuous learning and adaptability are highly valued in today's rapidly changing job market. Graduates possessing these competences can quickly acquire new skills and adapt to evolving demands, which increases their wages as their capabilities remain relevant over time. Finally, graduates who possess strong organization competences are better equipped to handle complex tasks and contribute positively to their organizations. As a result, they often receive higher wages due to their impact on overall productivity. These results go in favour of supporting H.2.

Hence, these results are suggesting a greater effect of general competences, instead of practical ones, on graduates' wages. This is an interesting result, as it would seem to contradict Probit estimation results on graduates' employability, which shows greater mismatch effect of practical competences. This suggests that even though employers are putting greater emphasis on the importance of general competences, when deciding to award an employment contract they are still more focused on the practical competences. Only after someone is employed, general competences seem to become more important in determining their wage level.

These results are not too surprising, given that it is difficult to evaluate candidates' general competences using various recruitment tests or during recruitment interview. Even though many of these tests include a psychological profile section, which should give an indication of candidates' acquired general competences, they are still primarily based on the occupation-specific questions and job-specific situation. Hence, it is not surprising that mismatch in practical occupation-specific competences is more important at this stage. On the other hand, mismatch in general competences is best evaluated during the actual work and hence connected to employee's remuneration.

Results of instrumental variable procedure using 2SLS estimation method (2nd stage results, 1st stage results are presented in column (2) of Table 7 in Appendix) are presented in column (3) of Table 5 and show that overall effect of mismatch in all skills/abilities on graduate wage is 13.1% (785 HRK ~ 100 EUR) on average, which is by about 10 percentage points higher than OLS estimates. Heckman sample selection model is used to accommodate for sample selection

bias, more precisely to account for self-selection of graduates into employment, and results are presented in columns (4) – (5) of Table 5. Results here are very much in line with initial OLS estimates, which is corroborated by statistical insignificance of Inverse Mill's Ratio, suggesting no self-selection problem. When analysing mismatch in all skills/abilities, wage penalty is estimated to be 4.8% (290 HRK ~ 40 EUR on average), which is higher by roughly one percentage point than OLS estimate. In terms of economics-and-business practical competences, only *economics and business theory and practice* is showing significant wage penalty effect of 1.7%, slightly higher than OLS's estimated 1.1% penalty. Looking at general competence set, *project management and professionalism* and *motivation and organization* show significant wage penalties of 1.3% and 1.9%, respectively (also slightly higher than OLS estimates).

4.4. Robustness check

For the robustness check, the proximity between employers' competence requirements and graduates' competence attainment is defined as in Equations 3 and 4. Results of robustness check for Employability model and Mincerian wage model are presented in Tables 8 and 9, respectively, in the Appendix. First two columns of both these tables show the results when competence proximity is measured using the distance between rankings (variable *DIST*) of particular competences (negative association expected – greater distance between required and attained competence rankings should lead to lower employability and wages); and columns (3) to (8) present the results when competence proximity is measured using different values of proximity parameter *p* (variable *PROX*) (positive association expected – greater number of ranking matches between required and attained competence rankings should lead to higher employability and wages). Of course, as approximation parameter *p* increases (thus allowing greater differences in ranking of competences by employers and graduates to still be labelled as weakly equivalent), estimated effects on employability and wage should gradually decrease.

Focusing on the Employability model, robustness checks result for all skill/ability items mainly corroborate original estimates but are higher by 1 and 4 percentage points for *Distance* and *PROX1* proximity measures, respectively. In terms of competences, practical competences are shown to be more important for graduates' employability, particularly *economics and business theory and practice*; *business communication*; and *quantitative-economics algebra*, which is also

in line with previous results. The story is very much similar for the Mincerian wage model. Robustness checks yielded results like those in original scenario, with general competences holding greater importance when it comes to determining wages.

5. Conclusion

This research analysed the mismatch on the labour market between the competences that employers require, on one side, and graduates acquire, on the other, and how is this associated with graduates' employability and wages. Analysis was carried out using a sample of economics and business graduates, and a general sample of firms in Croatia. Data was collected using questionnaires for graduates and firms, both containing the same list of skills and abilities sent out for evaluation, which were then combined in eight key competences of general and practical type.

Results point towards a mismatch between competence inventories required by employers and acquired by graduates. This is particularly emphasized for general competences which were all underdeveloped by graduates in relation to employers' needs. The greatest mismatch was found in *motivation and organization* competence and *project management and professionalism* competence. On the other hand, mismatches in practical competences, although significant, were somewhat smaller and overdeveloped in relation employers' needs.

These competence mismatches were then associated with graduates' employability and wages. Results here show that the probability of being employed significantly decrease with the existence of this mismatch (low proximity) by about 5% overall. Looking at key competences, results are significant only for competences of practical type *economics-and-business theory and practice* and *business communication*.

Shifting the focus from employability to wage returns, results for mismatch in all skill/ability-items grouped together indicate a wage penalty of about 3.9%. When we look at key competences, results are suggesting greater impact of mismatch in competences of general type – a wage penalty of 1.2% in case of *project management and professionalism* competence and 2.0% in case of *motivation and organization* competence. This indicates that in a situation where the job market is constantly evolving, and graduates need to demonstrate adaptability and a willingness to learn to remain relevant. Those with a growth mindset and a demonstrated ability to embrace new challenges are more likely to navigate the dynamic job landscape successfully.

Thus, results have shown that employers put greater emphasis on practical competences during initial screening of the candidates and when awarding employment contracts. Once the graduate has been employed, however, general competences are more important in securing a higher wage return for employee. Both written employment test and job interviews predominantly revolve around inquiries tailored to the specific occupation. Therefore, it's unsurprising that practical occupation-specific competences hold greater significance at this juncture. General competences, on the other hand, are most accurately assessed through actual job performance, consequently meriting higher remuneration.

Looking into the future, the issue of competence alignment on the labour market will further gain importance as firms, organizations, governments, and households continue to embrace digital and green technologies to stay competitive. Hence, investing in the development and cultivation of the right competences among employees becomes imperative. Organizations that prioritize building a competent and skilled workforce are better positioned to capitalize on the opportunities presented by digital transformation and thrive in the digital age.

Results of this research also carry certain policy implications. They indicate that higher education institutions need to align their curricula to meet the current demand on the labour market. However, these results go beyond only tertiary education - pupils in elementary and secondary schools should also be better equipped with these competences as some of them opt to enter the labour market instead of continuing to higher education. Additionally, some of these competences can be acquired, or greatly improved, by out-of-school or non-formal training, so these curricula should be updated as well. Higher education institutions could embed the concept of employability in the learning programme design process and into learning, teaching and assessment practices. Employability could be further enhanced by incorporating work experience in the curriculum, by building an institutional culture that promotes employability and by inviting employers as guest lecturers. The greatest mismatch between graduates and employers' competence inventories was found for general competences, such as *motivation and organization*, or *project management and professionalism*, which points at parts of curricula in a dire need of reform.

Finally, this research is not without limitations. Firstly, this analysis is focused on economics and business graduates, and it would be unwise to generalize these findings to job positions requiring other educational background. Even though *general* competences

may be transferable to positions held by employees with different background, their importance may be different. Second possible limitation may be the method of collecting data using online surveys. Even though online surveys offer substantial cost savings, greater options for editing and analysis, wider magnitude of coverage and quicker response time, they may also suffer from questionnaire display issues and lower levels of confidentiality. Thirdly, the response rate to these surveys were quite low, even though, as evidenced in similar research, this is quite standard for this kind of analysis. Next, competences requirements and competences development were evaluated by two different people (employers and graduates) – instead of the same person – who may use different subjective notions or yardsticks when measuring these. Fifth, due to data availability and focus of this research, graduates' data only includes 2011-2015 cohorts, and this analysis was carried in a time of a rebound of Croatian economy from 2008 financial crisis. Future research can also work towards prolonging this span as to include business cycle effects. Lastly, this research did not respond to how these competences are acquired in the first place and which factors influence the development degree of each competence, which is a valid topic for future research.

References

- Allen, J. and van Der Velden R. K. W. 2001. Educational mismatches versus skill mismatches: effects on wages, job satisfaction, on-the-job search. *Oxford economic papers* 53 (3): 434-452.
- Allen, J. and van Der Velden, R. K. W. 2009. *Competencies and early labour market careers of higher education graduates*. Ljubljana: University of Ljubljana, Faculty of Social Sciences.
- Amrhein, V., Greenland, S., and McShane, B. 2019. Scientists rise up against statistical significance. *Nature* 567: 305-307.
- Andrews, J. and Higson, H. 2008. Graduate employability, 'soft skills' versus 'hard' business knowledge: A European study. *Higher education in Europe* 33 (4): 411-422.
- Asfani, K., Suswanto, H., and Wibawa, A. P. 2016. Influential factors of students' competence. *World Transactions on Engineering and Technology Education* 14 (3): 416-420.
- Azevedo, A., Apfelthaler, G., and Hurst, D. 2012. Competency development in business graduates: An industry-driven approach for examining the alignment of undergraduate business education with industry requirements. *The International Journal of Management Education* 10 (1): 12-28.
- Babić, Z., Matković, T., and Šošić, V. 2006. Strukturne promjene visokog obrazovanja i ishodi na tržištu rada. [Structural Changes in Tertiary Education and Impacts on the Labour Market]. *Economic Trends & Economic Policy* 16 (108): 26-65.
- Becker, G. S. 1962. Investment in human capital: A theoretical analysis. *Journal of Political Economy* 70: 9-49.
- Biesma, R. G., Pavlova, M., van Merode, G. G., and Groot, W. 2007. Using Conjoint Analysis to Estimate Employers Preferences for Key Competencies of Master Level Dutch Graduates Entering the Public Health Field. *Economics of Education Review* 26 (3): 375-386.
- Biesma, R. G., Pavlova, M., Vaatstra, R., van Merode, G. G., Czabanowska, K., Smith, T., and Groot, W. 2008. Generic Versus Specific Competencies of Entry-Level Public Health Graduates: Employer's Perceptions in Poland, the UK, and the Netherlands. *Advances in Health Sciences Education* 13 (3): 325-343.
- Botrić, V. 2009. Unemployed and long-term unemployed in Croatia: evidence from Labour Force Survey. *Revija za socijalnu politiku* 16 (1): 25-44.
- Card, D. 2001. Estimating the Return to Schooling: Progress on Some Persistent Econometric Problems. *Econometrica* 69 (5): 1127-1160.
- Chiru, C., Ciuchete, S. G., Lefter, G. G., and Paduretu, E. 2012. A Cross Country Study on University Graduates Key Competencies. An Employer's Perspective. *Procedia-Social and Behavioral Sciences* 46: 4258-4262.
- Chung-Herrera, B. G., Enz, C. A., and Lankau, M. J. 2003. Grooming future hospitality leaders: A competencies model. *The Cornell Hotel and Restaurant Administration Quarterly* 44 (3): 17-25.
- Durrani, N. and Tariq, V. N. 2012. The role of numeracy skills in graduate employability. *Education + Training* 54 (5): 419-434.
- Fredriksson, P., Hensvik, L., and Skans, O. N. 2018. Mismatch of talent: Evidence on match quality, entry wages, and job mobility. *American Economic Review* 108 (11): 3303-38.
- Galić, Z. and Plećaš, M. 2012. Quality of working life during the recession: The case of Croatia. *Croatian Economic Survey* 14 (1): 5-41.
- García-Aracil, A. and Van der Velden, R. (2008). Competencies for young European higher education graduates: labor market mismatches and their payoffs. *Higher Education* 55 (2): 219-239.
- Gawrycka, M., Kujawska, J., and Tomczak, M. 2020. Competencies of graduates as future labour market participants—preliminary study. *Economic research* 33 (1): 1095-1107.
- Green, F. and McIntosh, S. 2007. Is there a genuine underutilization of skills amongst the over-qualified? *Applied Economics* 39 (4): 427-439.

- Grzybowska, K. and Łupicka, A. 2017. Key competencies for Industry 4.0. *Economics and Management Innovations* 1 (1): 250-253.
- GSIA. 2019. Global Sustainable Investment Review 2018. Global Sustainable Investment Alliance. Available at https://www.gsi-alliance.org/wp-content/uploads/2019/06/GSIR_Review2018F.pdf
- Heckman, J. J. 1979. Sample selection bias as a specification error. *Econometrica* 47 (1): 153-161.
- Hershbein, B. and Kahn, L. B. 2018. Do recessions accelerate routine-biased technological change? Evidence from vacancy postings. *American Economic Review* 108 (7): 1737-1772.
- Husain, M. Y., Mokhtar, S. B., Ahmad, A. A., and Mustapha, R. 2010. Importance of employability skills from employers' perspective. *Procedia-Social and Behavioral Sciences* 7: 430-438.
- Ilojty, M., Correa, P., Radas, S., and Škrinjarić, B. 2014. Stylized facts on productivity growth. Evidence from firm-level data in Croatia. Policy Research Working Paper 6990.
- Kelly, E., O'Connell, P., and Smyth, E. 2010. The Economic Returns to Field of Study and Competencies Among Higher Education Graduates in Ireland. *Economics of Education Review* 29 (4): 650-657.
- Lau, H. H., Hsu, H. Y., Acosta, S., and Hsu, T. L. 2014. Impact of participation in extra-curricular activities during college on graduate employability: an empirical study of graduates of Taiwanese business schools. *Educational Studies* 40 (1): 26-47.
- Matković, T. 2012. Educational Origins and Occupational Destinations? Dissecting the Education-Job Mismatch in School to Work Transitions in Croatia. In *Labour Market and Skills in the Western Balkans*, edited by M. Arandarenko and W. Bartlett, 73-101. FREN – Foundation for the Advancement of Economics, Belgrade.
- Mavromaras, K., McGuinness, S., and Fok, Y. K. 2009. Assessing the incidence and wage effects of overskilling in the Australian labour market. *Economic Record* 85 (268): 60-72.
- Mincer, J. 1974. *Schooling, Experience and Earnings*. New York: National Bureau of Economic Research. Columbia University Press.
- Nicolescu, L. and Paun, C. 2009. Relating Higher Education with the Labour Market: Graduates' expectations and employers' requirements. *Tertiary Education and Management* 15 (1): 17-33.
- Obadić, A. 2005. Dezagregirana analiza tržišta rada Hrvatske prema stručnoj spremi i djelatnostima. [Disaggregated analysis of Croatian labour market according to qualification level and activities]. *Ekonomija* 11 (4): 586-620.
- Obadić, A. (2006a). Theoretical and empirical framework of measuring mismatch on a labour market. *Zbornik radova Ekonomskog fakulteta u Rijeci: časopis za ekonomsku teoriju i praksu* 24 (1): 55-80.
- Obadić, A. (2006b). Influence of regional mismatch on the employment process in selected transition countries. *Ekonomski pregled* 57 (1-2): 3-30.
- Obadić, A. and Oršolić, D. 2012. Kvalifikacijska (ne) usklađenost ponude i potražnje visokoobrazovanih osoba na tržištu rada Grada Zagreba [Qualification (mismatch) of highly educated individuals in the labour market of City of Zagreb]. *Ekonomski pregled* 63 (12): 681-712.
- Obadić, A. and Majić, E. 2013. Analiza strukture nezaposlenosti visokoobrazovanih osoba u Republici Hrvatskoj i mjere za njezino smanjivanje. [Unemployment Structure Analysis in Highly Educated People in Croatia and Measures for Reduction of Unemployment]. *Poslovna izvrsnost* 7 (2): 103-123.
- Pan, P. and Perera, H. 2012. Market relevance of university accounting programs: Evidence from Australia. *Accounting Forum* 36 (2): 91-108.
- Postel-Vinay, F. and Lise, J. 2015. Multidimensional skills, sorting, and human capital accumulation. In *2015 Meeting Papers No. 386*. Society for Economic Dynamics.
- Rieckmann, M. 2012. Future-oriented higher education: Which key competencies should be fostered through university teaching and learning? *Futures* 44 (2): 127-135.
- Robles, M. M. 2012. Executive perceptions of the top 10 soft skills needed in today's workplace. *Business communication quarterly* 75 (4): 453-465.
- Sá, M. J., Santos, A. I., Serpa, S., and Miguel Ferreira, C. 2021. Digitainability—Digital competences post-COVID-19 for a sustainable society. *Sustainability* 13 (17): 9564.
- Škrinjarić, B. 2022. Competence-based approaches in organizational and individual context. *Humanities and social sciences communications* 9 (28): 1-12.
- Teijeiro, M., Rungo, P., and Freire, M. J. 2013. Graduate competencies and employability: The impact of matching firms' needs and personal attainments. *Economics of Education Review* 34: 286-295.
- Tomić, I. and Domadenik, P. 2012. Matching, adverse selection and labour market flows in a (post)transition setting: the case of Croatia. *Post-Communist Economies* 24 (1): 39-72.
- Tomić, I. 2014. Structural unemployment in Croatia – How important is the occupational mismatch? *Economic Research* 27 (1): 346-365.
- UNEP. 2016. *UNEP Frontiers 2016 Report: Emerging Issues of Environmental Concern*. United Nations Environment Programme, Nairobi. Available at https://wesr.unep.org/media/docs/assessments/UNEP_Frontiers_2016_report_emerging_issues_of_environmental_concern.pdf
- Van Der Heijde, C. M. and Van Der Heijden, B. I. J. M. 2006. A competence-based and multidimensional operationalization and measurement of employability. *Human Resource Management* 45 (3): 449-476.

- Van Deursen, A. J. and Van Dijk, J. A. 2014. The digital divide shifts to differences in usage. *New media & society* 16 (3): 507-526.
- Waddell, D. L. 2001. Measurement issues in promoting continued competence. *The Journal of Continuing Education in Nursing* 32 (3): 102-106.
- Watson, R., Calman, L., Norman, I., Redfern, S., and Murrells, T. 2002. Assessing clinical competence in student nurses. *Journal of Clinical Nursing* 11 (4): 554-555.
- World Economic Forum. 2016. The future of jobs: Employment, skills and workforce strategy for the fourth industrial revolution. World Economic Forum.
- Yamaguchi, S. 2012. Tasks and heterogeneous human capital. *Journal of Labor Economics* 30 (1): 1-53.
- Yang, M. Y., You, M., and Chen, F. C. 2005. Competencies and qualifications for industrial design jobs: implications for design practice, education and student career guidance. *Design Studies* 26 (2): 155-189.
- Zehrer, A. and Mossenlechner, C. 2009. Key Competencies of Tourism Graduates: The Employer's Point of View. *Journal of Teaching in Travel and Tourism* 9 (3-4): 266-287.
- Zhao, H., Seibert, S. E., and Hills, G. E. 2005. The mediating role of self-efficacy in the development of entrepreneurial intentions. *Journal of applied psychology* 90 (6): 1265.

APPENDIX

Table 6. Description of variables collected from graduates

| Variable | Description |
|----------------------------------|---|
| <i>Personal information</i> | |
| age | age of respondent |
| sex | sex of respondent |
| region | region of the firm: 1-Central Croatia, 2-North-western Croatia, 3-East Croatia, 4-North Adriatic and Lika, 5-Central and South Adriatic |
| urban | dummy for urban settlement |
| married | dummy for being married |
| <i>Household information</i> | |
| hh | number of people living in same household |
| hh_y | household total income |
| car | cars owned by household |
| educ_dad | father's highest education level: 1-Basic elementary education, 2-High school education, 3-University education |
| educ_mom | mother's highest education level: 1-Basic elementary education, 2-High school education, 3-University education |
| <i>Education information</i> | |
| educ_years | total years of education |
| educ_foreign | abroad education dummy |
| educ_highest_gpa | GPA of highest level of education |
| ft_student | dummy for full time students |
| priv_educ | dummy for private ownership institution where highest education level was obtained |
| educ_work | dummy for working during highest education level |
| <i>Labour market information</i> | |
| emp_d | employment dummy |
| work_exp | total work experience |
| emp_own_priv | dummy for private ownership of employer |
| emp_l | size of employer based on number of workers: 1-Micro, 2-Small, 3-Medium, 4-Large |
| position | position of respondent within a company: 1-Owner, 2-Manager, 3-Worker |
| training | training in last year dummy |
| wage | income of respondent |

Notes: All monetary values are expressed in Croatian kuna, HRK (1 EUR = 7.529 HRK, 2016 average). Information about definitions of regions are available on request.

Source: Authors calculations based on questionnaire data.

Table 7. Results of 1st stage of 2SLS estimation procedure for Employability model and Mincerian wage model

| | Employability (1) | Wages (2) |
|--------------------------------------|----------------------|----------------------|
| Instruments | | |
| Father education (benchmark primary) | | |
| Secondary education | -0.840*** (0.314) | -0.523*** (0.156) |
| Tertiary education | -0.499 (0.334) | -0.373** (0.164) |
| Mother education (benchmark primary) | | |
| Secondary education | -0.928*** (0.234) | -0.170* (0.100) |
| Tertiary education | -0.886*** (0.250) | -0.269** (0.104) |
| Personal characteristics | Yes | Yes |
| Household characteristics | Yes | Yes |
| Education characteristics | Yes | Yes |
| Labor market characteristics | Yes | Yes |
| Wald statistic | 6.725*** | |
| Durbin statistic | | 9.807*** |
| Wu-Hausman statistic | | 9.463*** |
| <i>N</i> | 1,009 | 648 |
| <i>R</i> ² | 0.698 | 0.588 |
| Adjusted <i>R</i> ² | 0.655 | 0.565 |

Notes: (***), (**) and (*) denote 1%, 5% and 10% level of significance, respectively. Standard errors in parentheses.

Source: Authors calculations based on questionnaire data.

Table 8. Robustness check results for Employability model

| | Distance | | PROX1 ($p = 1$) | | PROX2 ($p = 2$) | | PROX3 ($p = 3$) | |
|--|--|----------------------|--------------------|---------------------|---------------------|--------------------|-------------------|---------------------|
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
| Distance/Proximity in all skill/ability-items | -0.063*** (0.023) | | 0.094** (0.043) | | 0.027*** (0.008) | | 0.012 (0.008) | |
| Distance/Proximity in practical competences | Economics and business theory and practice | -0.045*** (0.007) | | 0.037* (0.021) | | 0.012 (0.025) | | 0.004 (0.022) |
| | IT proficiency | 0.004 (0.006) | | 0.032 (0.028) | | -0.013 (0.021) | | -0.018 (0.026) |
| | Business communication | -0.025*** (0.008) | | 0.028** (0.013) | | 0.022* (0.012) | | 0.019 (0.036) |
| | Quantitative-economics algebra | -0.017*** (0.006) | | 0.040*** (0.012) | | 0.048** (0.020) | | 0.048*** (0.017) |
| Distance/Proximity in general competences | Collectedness, presentation and teamwork | -0.005 (0.008) | | 0.011 (0.017) | | -0.014 (0.022) | | 0.003 (0.041) |
| | Project management and professionalism | -0.050* (0.022) | | 0.064** (0.021) | | 0.063* (0.039) | | -0.009 (0.018) |
| | Advocacy, language fluency | -0.009 (0.009) | | 0.015 (0.017) | | -0.015 (0.025) | | 0.013 (0.067) |
| | Motivation and organization | -0.004 (0.005) | | -0.022 (0.023) | | -0.026 (0.022) | | 0.006 (0.021) |
| <i>N</i> | 1,009 | 1,009 | 1,009 | 1,009 | 1,009 | 1,009 | 1,009 | 1,009 |
| Pseudo R^2 | 0.745 | 0.757 | 0.739 | 0.755 | 0.749 | 0.758 | 0.740 | 0.746 |

Notes: (***) , (**) and (*) denote 1%, 5% and 10% level of significance, respectively. Standard errors in parentheses. All models also included personal characteristics, household characteristics and educational characteristics of a graduate. Personal characteristics variables: age, sex, region, type of settlement, marital status. Household characteristics variables: number of household residents, total household income, number of cars owned by household. Education characteristics variables: foreign education, GPA at graduation, student status, HE institution ownership type and whether student worked during studies. Estimated coefficients of personal, household, education and labor market variables are not reported as they were not the focus of the research and due to presentation purposes but are available on request.

Source: Authors' calculations based on questionnaire and FINA data.

Table 9. Robustness check results for augmented Mincerian wage model

| | | Distance | | PROX1 ($p = 1$) | | PROX2 ($p = 2$) | | PROX3 ($p = 3$) | |
|--|--|----------------------|----------------------|--------------------|--------------------|-------------------|-------------------|-------------------|-------------------|
| | | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
| Distance/Proximity in all skill/ability-items | | -0.032*** (0.001) | | 0.025** (0.011) | | 0.017* (0.008) | | 0.007 (0.006) | |
| Distance/Proximity in practical competences | Economics and business theory and practice | | -0.016*** (0.003) | | 0.016** (0.006) | | 0.014* (0.007) | | 0.005 (0.008) |
| | IT proficiency | | -0.003 (0.002) | | 0.009 (0.008) | | 0.016 (0.011) | | 0.012 (0.009) |
| | Business communication | | -0.010 (0.008) | | 0.031 (0.028) | | 0.034 (0.024) | | 0.015 (0.011) |
| | Quantitative-economics algebra | | -0.001 (0.002) | | 0.008 (0.010) | | 0.009 (0.009) | | -0.001 (0.008) |
| Distance/Proximity in general competences | Collectedness, presentation and teamwork | | -0.001 (0.003) | | 0.010 (0.007) | | 0.007 (0.009) | | 0.001 (0.026) |
| | Project management and professionalism | | -0.009*** (0.002) | | 0.016** (0.007) | | 0.010* (0.004) | | 0.036 (0.028) |
| | Advocacy, language fluency | | -0.005 (0.003) | | 0.009 (0.007) | | 0.011 (0.008) | | 0.033 (0.027) |
| | Motivation and organization | | -0.018*** (0.004) | | 0.015** (0.006) | | 0.009* (0.004) | | 0.007 (0.009) |
| <i>N</i> | | 648 | 648 | 648 | 648 | 648 | 648 | 648 | 648 |
| <i>R</i> ² | | 0.885 | 0.893 | 0.885 | 0.890 | 0.885 | 0.890 | 0.886 | 0.892 |
| Adjusted <i>R</i> ² | | 0.745 | 0.879 | 0.887 | 0.879 | 0.883 | 0.879 | 0.884 | 0.880 |

Notes: (***), (**) and (*) denote 1%, 5% and 10% level of significance, respectively. Standard errors in parentheses. All models also included personal characteristics, household characteristics, education characteristics and labor market characteristics of a graduate. Personal characteristics variables: age, sex, region, type of settlement, marital status. Household characteristics variables: number of household residents, total household income, number of cars owned by household. Education characteristics variables: foreign education, GPA at graduation, student status, HE institution ownership type and whether student worked during studies. Labor marker characteristics variables: total work experience, employers' ownership type, employers' size, workers position within firm and total duration of training received at work. Estimated coefficients of personal, household, education and labor market variables are not reported as they were not the focus of the research and due to presentation purposes but are available on request.

Source: Authors' calculations based on questionnaire and FINA data.