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EXPLORING FACTORS INFLUENCING THE CZECH EMPLOYEES' EARNINGS

[Zkoumání faktorů ovlivňujících výdělky českých zaměstnanců]

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Abstract: The study contributes to the body of knowledge on job-related and individual characteristics determining the earnings of those working as employees. A multivariate analysis of the 2010 and 2015 European Survey on Working Conditions data (N=1,168) documents the differences in earnings across studied variables, such as gender, educational level, the skill level of profession, years of experience or perceived discrimination. The obtained results are interpreted in line with the prior research. It follows from the main findings that the highest earnings are observed among managerial professions and the lowest among the least skilled occupations. Returns to education are increasing with the obtained level of formal education and are highest for doctoral studies graduates. The positive impact has also years of experience and the number of working hours per week. Quite surprisingly, the conducted analysis does not prove any significant effect of discrimination (sexual orientation, religion, disability, race, ethnic background or colour) on individuals' earnings. The study might be of interest to the Czech labour market researchers and policymakers as it, besides the analysis, provides several future research suggestions.

Keywords: earnings, employee, income, occupational skill level.

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Introduction

Economists and labour market researchers have been discussing the factors, circumstances and characteristics determining personal income and earnings for over decades. The essential contribution to a better understanding of this phenomenon was the concept of human capital, which was empirically studied by Jacob Mincer, who contributed to the field with his famous earnings equation model. The model considers experience and formal education as crucial determinants of individuals' earnings function (Mincer and Polachek 1974, Vella and Verbeek 1998, Chiswick 2003, Polachek 2008).

Empirical researchers have expanded the original equation of schooling and experience by including other relevant factors impacting earnings and testing their empirical validity (Angrist and Krueger 1991, Mincer 1997). The Mincer equation function was thus used to study the role of basic individual characteristics, including age (Bhuler et al. 2017), ethnicity and nationality (García-Aracil and Winter 2006), gender pay gap (Hedija 2017), sexual orientation (Martell 2019), discrimination and disability (Nikoloski et al. 2018). However, also the role of family status, children and household characteristics (Chiswick 2003), and living region (Beenstock and Felsenstein 2008). More recently, the studies have focused on job-related aspects, including the size of the organization (Rasekhi et al. 2019), occupational qualification (Mattijssen et al. 2020) and commuting (Vontroba et al. 2020).

As seen from the studies mentioned above, the body of knowledge is extensive, rich in contributions from diverse countries with various institutional and cultural backgrounds, documenting findings depending on the presented context (Das and Polachek 2019). Our study extends the current state of the art by providing novel insights from the Czech Republic, a small European open economy (Vokoun 2016, Stoklasová 2017, Pošta and Hudeček 2017)

2022 Volume XXII(2): 16-25
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with about four million working employees (Czech Statistical Office 2022). It also enriches the regional body of knowledge by revisiting, replicating and expanding findings of prior studies on determinants of earnings conducted within the Czech context, i.e., studies focusing on all employees in the economy (Urbánek 2013, Maršíková 2015, Balcar and Gottvald 2016, Raudenská and Mysíková 2020), selected regions (Moritz 2009, Vontroba et al. 2020) or specific occupations and sectors (Bílková 2015, Nedomová et al. 2017, Šťastný and Janáček 2021).

In this research study, we ask the following main research question: what factors and job-related aspects determine the earnings of Czech employees? To provide the answer, we conduct a multivariate regression analysis of the 2010 and 2015 European Survey on Working Conditions data (N=1,168), providing additional insights to the community and policymakers. Furthermore, we emphasize the skill level of professions, testing the assumption the more is employee ranked in the skill level of occupations, the higher earnings get (Laurison and Friedman 2016, Mattijssen et al. 2020), which has not been tested yet within the Czech context before. Our analysis is controlled for a wide range of individual characteristics such as gender, educational level, the skill level of the profession, years of experience or perceived discrimination. These were selected based on the previous studies and the availability of our dataset, which we describe in the next section.

1 Research sample and variables

The study works with the representative survey data of the Czech labour market collected by the officials of the European Foundation for the Improvement of Living and Working Conditions - Eurofound (2022) agency. It is one of the longest-lasting representative surveys that has been run in Europe since 1991, and the Czech Republic joined the survey initiative in 2001. The survey includes a wide range of information about individuals participating in the labour market, especially their earnings and income, which Czech people generally do not like to share for research purposes or discuss with others (Tepperová 2019, Raudenská and Mysíková 2020). The data collection is conducted every five years, and the target sample size is about 1,000 individuals. Eurofound (2022) then harmonizes the data from all participating countries and publishes them online on its website and at the UK Data Service archive. It provides insights into the data collection procedures, country samples, weights, harmonization procedures and codebook (Eurofound 2018). Our goal was to use multiple years of the survey to ensure our results were not biased to only one particular year of the survey. Still, at the same time, we were restricted by the availability of other harmonized variables, such as earnings or skill level classification of professions. The latest data collection was conducted in 2021, but the methodology, given the world pandemic, had to be changed. Thus, the latest survey data are incompatible with the previous years, mainly due to the online data collection procedure in 2021. As a result of these circumstances, we decided to work with the survey years 2010 and 2015, which contain all necessary variables relevant to our empirical analysis.

The initial sample had 2,002 individual-level observations; after restricting it to only employees with non-missing data for the studied variables, our final dataset provides information about 1,168 employees. Our dependent variable captures the Czech employees' *net monthly income* (in harmonized euros). The studied factors cover basic individual characteristics, such as respondent' *age* (in years), *gender* (=1 if the respondent is a female), *migration* background (=1 if the respondent was born outside of the Czech Republic) and household characteristics, including information about living with a *partner/spouse* (=1 if yes), whether the *partner/spouse works part/full time* (=1 if yes), a *number of people* and *children under 15* living in the respondent' household.

2022 Volume XXII(2): 16-25
DOI: 10.25142/aak.2022.012

Then we consider the respondents' human capital levels, proxied by the level of *formal education* (according to the International Standard Classification of Education – ISCED, 2011) and accumulated *years of experience* in the current company or organization. The key job-related aspects include the *skill level of the profession*, according to International Labour Organization (2008) categories, divided into low-skilled, medium-skilled, and high-skilled occupations without managers and managers. We also control for the number of *working hours per week*, respondents' experience of *discrimination* (in the last 12 months) concerning sexual orientation, religion, disability, race, ethnic background or colour and *industry classification* of the employer (according to NACE-2 Rev standards). Descriptive statistics (frequencies, mean, standard deviation, minimum, and maximum) for the used variables are presented in Table 1.

Table 1: Descriptive statistics

Variable	**Frequency (%)**	**N**			
Female (=1)	48.4	1,168			
Migrated (=1)	3.1	1,168			
Primary education or first stage of basic education (=1)	0.4	1,168			
Lower secondary or second stage of basic education (=1)	11.9	1,168			
(Upper) secondary education (=1)	66.6	1,168			
Post-secondary non-tertiary education (=1)	5.5	1,168			
First stage of tertiary education (BSc./MSc./MBA) (=1)	15.5	1,168			
Second stage of tertiary education (PhD) (=1)	0.1	1,168			
Low-skilled Professions (=1)	7.0	1,168			
Medium-skilled Professions (=1)	59.8	1,168			
High-skilled Professions without Managers (=1)	30.2	1,168			
Managers (=1)	3.0	1,168			
Living with a Partner/Spouse (=1)	78.4	1,168			
Partner/Spouse Works Part/Full-time (=1)	36.7	1,168			
Subject of Discrimination because of Sexual Orientation (=1)	0.2	1,168			
Subject of Discrimination because of Religion (=1)	0.5	1,168			
Subject of Discrimination because of Disability (=1)	1.3	1,168			
Subject of Discrimination (Race, Ethnic Background or Colour)	1.1	1,168			
Variable	**Mean**	**SD**	**Min**	**Max**	**N**
Net Monthly Income	628.8	321.9	0.55	3,657	1,168
Age	43.2	11.5	18	65	1,168
Working Hours per Week	40.0	9.4	2	50	1,168
Years of Experience in Current Company	9.1	8.6	1	50	1,168
Number of People in Household	2.7	1.1	1	6	1,168
Number of Children under 15	0.4	0.8	0	4	1,168

Notes: Employees only. Post-stratification weights applied.
Source: STATA 14, own calculations based on the European Survey on Working Conditions 2010 and 2015 data (Eurofound 2018)

2022 Volume XXII(2): 16-25
DOI: 10.25142/aak.2022.012

Multivariate analysis

Our empirical approach is based on the econometric estimation of the earnings function, having as dependent variable earnings transformed into a natural logarithm and characteristics of employees and their jobs on the right side, serving as explanatory variables. Empirical estimation of the so-called Mincer earnings equation (Mincer and Polachek 1974, Polachek 2008) is an established practice used numerously by scholars, for example, recently in studies by Consiglio and Sologon (2022) or Duleep et al. (2022). Following the econometric standards and methodology (Vella and Verbeek 1998, Verbeek 2008), we estimate a multivariate regression model with the ordinary least squares (OLS) technique. We further adjust our estimates for the size of the Czech workforce by using included country weights and standard errors to be robust and include year and industry dummy variables. The estimated model is depicted in Table 2. It is statistically significant based on the model F-test results, and we interpret the findings based on the significance of individual variables determined by t-tests.

Our results provide empirical support for the role of several variables identified by the previous literature (Balcar and Gottvald 2016, Vontroba et al. 2020, Raudenská and Mysíková 2020) but not all factors were found to be significant. First, we observe that women have, on average, lower earnings than men by approximately 26.5%, which is in line with the previous studies (Balcar and Gottvald 2016, Hedija 2017). The economic returns to education are increasing with the obtained level of formal education and are highest for doctoral studies graduates. This was earlier observed by Urbánek (2013) and Maršíková (2015), who note that rather overqualification is a problem within the Czech context, despite the estimated returns to education being still positive. Every additional year of working experience is also positively reflected in higher personal earnings (Večerník 2013, Matějů and Večerník 2015). Nevertheless, we could not prove the significance of the non-linear pattern of the experience squared (and age squared) variable known in the previous studies (Polachek 2008). We also see the positive effect of working hours, again expected by the economic theory of the labour market (Finardi and Fischer 2017, Das and Polachek 2019). From the career development perspective, it is interesting to see which professions are associated with the highest earnings (Laurison and Friedman 2016, Mattijssen et al. 2020, Deming and Noray 2020). The answer is straightforward, and in line with prior studies (Eriksson et al. 2000), we find that, on average, managerial occupations are associated with the highest earnings. For example, when compared with elementary occupations, managers earn, on average, 38.7% more, while other highly skilled professions 37.9% more, and medium-skilled occupations by 26% more. According to the regression analysis, work- and human capital-related characteristics are the most significant drivers of the Czech employees' incomes. Surprisingly, we do not find empirical support for the role of age, migration background, discrimination experience or family and household characteristics which were identified as relevant by the international literature (Nikolski et al. 2018, Das and Polachek 2019, Consiglio and Sologon 2022).

2022 Volume XXII(2): 16-25
DOI: 10.25142/aak.2022.012

Table 2: Determinants of the Czech employees' earnings (Robust Ordinary Least Squares estimates)

Independent variables/dependent variables	Log (Net Monthly Income)
Age	-0.000598
	(0.00164)
Female	-0.265***
	(0.0388)
Migrated	0.0207
	(0.0616)
Primary education or first stage of basic education	0.404***
	(0.119)
Lower secondary or second stage of basic education	0.492***
	(0.102)
(Upper) secondary education	0.636***
	(0.0910)
Post-secondary non-tertiary education	0.770***
	(0.132)
First stage of tertiary education (BSc./MSc./MBA)	0.881***
	(0.118)
Second stage of tertiary education (PhD)	1.695***
	(0.216)
Medium-skilled Professions	0.260***
	(0.0598)
High-skilled Professions without Managers	0.379***
	(0.0704)
Managers	0.387*
	(0.193)
Years of Experience	0.00623**
	(0.00192)
Working hours per week (usual)	0.0175***
	(0.00284)
Living with a Partner/Spouse	0.0585
	(0.0442)
Partner/Spouse Works Part/Full-time	0.0107
	(0.0608)
Number of People in Household	0.0118
	(0.0178)
Number of Children under 15	0.00394
	(0.0222)
Subject of Discrimination because of Sexual Orientation	0.377
	(0.231)
Subject of Discrimination because of Religion	-0.0249
	(0.0941)
Subject of Discrimination because of Disability	0.0254
	(0.125)
Subject of Discrimination (Race, Ethnic Background or Colour)	-0.0916
	(0.0944)
Constant	4.678***
	(0.171)
Industry dummies (NACE codes)	Yes
Year dummies	Yes
Observations	1,168
Prob > F	0.000
R-Squared (R^2)	0.286
Adjusted R^2	0.263
Akaike information criterion (AIC)	1848.4
Bayesian information criterion (BIC)	2035.7

Notes: Sample of the Czech employees only. Post-stratification weights were applied. Robust standard errors are in parentheses, statistical significance is reported as follows: + $p < 0.10$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$. Reference groups for dummy variables: *Male*; *Native of own Country; Less than Primary Education; Low-skilled Professions, Not Living with a Partner/Spouse, Partner/Spouse not Working, Subject of Discrimination because of Sexual Orientation, Religion, Disability, Race, Ethnic, Background or Colour*

Source: STATA 14, own estimates based on the European Survey on Working Conditions 2010 and 2015 data (Eurofound 2018)

2022 Volume XXII(2): 16-25
DOI: 10.25142/aak.2022.012

Conclusion

The article has provided insights into the factors and characteristics determining the earnings of Czech employees based on the data obtained from the 2010 and 2015 European Survey on Working Conditions (EWCS) data (N=1,168). The conducted analysis reached empirical support for the assumption that there is a nexus between the skill level of occupation and the earnings, showing the highest earnings are observed among managerial professions and the lowest among the least skilled occupations (Laurison and Friedman 2016, Mattijssen et al. 2020). The Czech employees' continuous investments in human capital (skills, experience and education) seem to be economically rewarding, based on the presented findings and expert opinions (Balcar et al. 2018, Koutná and Janíčko 2018, Kašparová 2019, Mysíková and Večerník 2019).

The study provides value for the regional community by demonstrating the procedures described by Polachek (2008), advising researchers on the key steps needed to estimate the Mincer earnings equation, with the dependent income variable transformed into the form of the natural logarithm and explanatory factors reflecting individual characteristics on the right side of the econometric equation. Once working with the survey data, the scholars should not forget to use the included weights to ensure the study's representativity and have most of the potentially relevant independent variables. Despite the novelty and contributions of the study, providing perspective from the EWCS data and factors that have not been explored before sufficiently, such as the role of the skill level of professions and discrimination, several limitations need to be discussed. The EWCS is a statistically representative dataset, but still, the number of observations is limited and significantly lower, compared to those available, for example, in the Information System on Average Earnings used by Balcar and Gottvald (2016) or in European Union Statistics on Income and Living Conditions used by Raudenská and Mysíková (2020). Regardless of that, EWCS provides additional perspective to the estimation of the earnings equation, enhancing the diversity of the current evidence. Furthermore, we worked only with the two waves of EWCS data. The earnings and skills of individuals develop over time. Thus, the best option would be to work with the longitudinal dataset, tracking skills and professional growth of employees, helping to prove the causality of the studied nexus more rigorously.

Lastly, there are several recommendations for future research, starting with the absence of the effect of age and non-linearity between years of experience and earnings (Angrist and Krueger 1991, Mincer 1997) within the Czech context. This could be possibly explained by the post-transitional development of the former socialist economy, where the labour market had to be significantly reshaped and where employees had to learn new skills and adapt to professions that had not been available or needed under the former regime. Therefore, the number of years of experience might not have yet thus translated into the economic benefits of the accumulated knowledge and skills (Chase 1998, Verwiebe et al. 2017). We suggest future researchers revisit the relationship and test it with the help of different datasets. Similarly, it would be worth studying the role of household and family-related characteristics that were not empirically validated in our analysis but were found to be significant in a recent study by Vontroba et al. (2020) using primary survey data. The critical question for future studies is whether this non-significance could be influenced by the type of used dataset/survey, the range of variables included in the regression model or whether the family and household characteristics are more profound in some regions than in others. The qualitative research approach can also address the such phenomenon, revealing what kind of family or household situations are more likely associated with higher earnings. Another research opportunity is hidden in the role of discrimination and diversity, which was

suggested as important in recent studies, but was not found significant within our analysis (Nikoloski et al. 2018, Černušáková 2021). Despite this non-finding, the study joins the up-to-date research debate, asking whether individual perceptions and attitudes to the various ethnicities and nationalities can be translated into higher/lower earnings, conditioned to the other factors and variables unchanged. Finally, we call for more comparative research studies covering multiple Central European countries, allowing us to uncover and develop context-specific knowledge reflecting this region.

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