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THE EFFECT OF EDUCATION ON EARNINGS IN A POST-CONFLICT ECONOMY: EVIDENCE FROM BOSNIA AND HERZEGOVINA

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Abstract

This paper investigates the effect of formal education on individual earnings in Bosnia and Herzegovina (BiH). We use empirical regression analysis and an extended Mincer's model, which are applied to the Labour Force Survey data from 2018. Our empirical results suggest that a higher level of both statutory and additional education has positive and statistically significant effect on higher earnings of individuals in this post-conflict society. Such a finding implies that investment in education, both statutory and additional, bring economic benefits to individuals, although this is sometimes challenged by the general public of this society. Moreover, we find that employees in the public sector record systematically higher earnings than those in the private sector, suggesting a need for strategic policies targeting this difference. The outcome of our analysis is a good indicator of productivity achieved through improved educational performance, and thus provides scientific evidence to the positive effect of human capital hypothesis in BiH.

JEL classification: A20, J30

Keywords: education, individual earnings, human capital, Bosnia and Herzegovina

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Introduction

The challenges of economic development under conditions of globalisation are increasingly becoming a topic of discussion for international organisations dealing with the scientific research of development. In this context, education and knowledge are viewed as the main development resources. Education can have an impact on social development only by improving the quality of human capital. Therefore, special attention needs to be paid to the quality of human resources, i.e. the quality of human capital and individual facets of social development. From the long-term perspective, the share of human capital in the overall capital depends on the share of knowledge which individuals acquire, their skills, competencies and other attributes. In this process, the management of acquired knowledge and its additional growth, i.e. accumulation, is the most important aspect.

To understand the basis of human capital, it is necessary to understand the development of different types of knowledge from childhood to adulthood. Economics of education is a relatively new field which has generated a number of hypotheses, empirical research studies and Nobel Prize winners in its historical development. Unfortunately, there is no wider implementation based on scientific research in practice, especially for post-conflict societies like BiH.

Keeping in mind the continuous discourse on the socio-economic role of education in Bosnia and Herzegovina, this paper will provide a science-based analysis which is relevant for an examination of the role of education in this economy. The focal point of the paper is the analysis of the effect of education on the earnings of individuals. The empirical section of the paper is based on a sample of data from BiH Labour Force Survey, while the theoretical underpinning is based on the Mincer's earnings model (Mincer, 1974) as one of the foundations of labour economics (Grossbard, 2006). By applying the adequate quantitative research method, the Mincer earnings model is adapted to the economic and social circumstances in BiH.

Based on the analysis of previous studies in the field, it can be concluded that there has been no comprehensive research analysing the effect of education on the earnings of individuals in BiH, in particular where additional education is concerned. The availability of such analyses is a good indicator for the productivity of education and the support to individuals in their efforts to invest in their own human capital.

Literature review

Mincer (1974), as one of the most prominent names in this field, argues that the better educated and more experienced workers earn more annually than their less qualified colleagues for two reasons: their hourly earnings are higher and the time spent on paid work is longer. He had presented a seminal model in economic literature which indicates that earning depends on years of education and work experience. Many other economic studies (for examplez: Card, 1999; Heckman, Lochner & Todd, 2003; Psacharopoulos & Patrinos, 2004; Lemieux, 2003; Efendic & Pugh, 2018) use the Mincer's earnings model and prove its validity as a statistical tool which can be used to predict individual earnings.

However, since the 1960s, the main link between education and the labour market has been the neoclassical theory of human capital. The significance of human capital for individual success and economic development has been widely accepted. More recent studies confirm that human capital, and especially cognitive skills, are the key drivers of long-term economic development (Angheluta et al., 2020; Hanushek & Kimko, 2000; Hanushek & Woessmann, 2008). Macroeconomic studies show a positive link between human capital – represented by the level of education – and economic growth (Barro, 1991; Becker, 1994; Mincer, 1974; Olaniyan & Okemakinde, 2008; Psacharopoulos & Patrinos, 2004; Sala-I-Martin, Doppelhofer & Miller, 2004). According to Romer (1996), new theories of economic growth recognize the importance of human capital, and they support the thesis on the accumulation of knowledge as its primary determinant. Studies on factors of economic growth and standard of living conducted in the last decade of the 20th century showed that human capital is an important factor for improved physical capital (e.g. Borozan, 2006), i.e. that the highest rates of return are achieved from the investment in human capital.

One of the foundations of the development of competitiveness of human resources is the quality of the formal education system. It has been proven that education contributes to productivity – therefore, the increase of general education level should be the top priority for a country striving to achieve a higher standard of living (Hall, 2002).

Thus, the main desired outcome of different forms of education is better productivity of labour, as well as efficiency and effectiveness of business in general

(Bartel, 1994; Hurley & Hult, 1998; Mat & Razak, 2011). As the world economy is becoming increasingly complex and connected, the importance of education is increasing in the 21st century, and the need for well-educated workers is growing. The nature of employment is changing – the trend is moving towards highly qualified "specialised workers". Products and services based on concrete knowledge, which includes producers of the most advanced mid and high tech, as well as main tech users such as financial and professional services, for example, are generating more than half of GDP in the OECD countries, and they keep growing fast. Adequate applicable skills and job satisfaction are indicators which show how well the skills acquired through education match labour force demands and how they influence the productivity of workers and thus the overall economic performance of the region (Rodríguez -Pose & Vilalta-Bufí, 2004).

There are multiple reasons why investment in human resources is often mentioned in debates on economic policies. Above all, it is one of the key factors for the development of modern knowledge-based economies, and as such, it is highlighted in strategic documents such as the Lisbon Strategy (European Union, 2000)[3]. Along with its positive effects on growth and development, education is also highlighted as a priority of economic policies because of its potential for "social inclusion", i.e., for providing additional opportunities to the excluded, unemployed and poor.

The literature in economics explores the relationship between human capital and economic results with a focus on the hypothesis that investments in human capital can explain the economic differences among countries (Schultz, 1961). As a rule, economic theory also recognises that investments in education and the development of competences contribute to better income in the lives of people (Becker, 1962). A significant number of empirical studies confirm that the level of education has an impact on the level of earnings of individuals (for example: Card, 1999; Efendic & Pugh, 2018; Harmon, Oosterbeek & Walker, 2003; Heckman, Lochner & Todd, 2006; Moock, Patrinos & Venkataraman, 2003; Pereira & Martins, 2014; Psacharopoulos, 1994; Psacharopoulos & Patrinos, 2004; Risal & Gupta, 2017; Yakum & Kifem, 2018; Zwane, 2020). There is also compelling evidence that the better-educated individuals have higher earnings and less probability of being unemployed (for example Mulligan, 1997; Patel, 2019). Many studies in different countries also show that better-educated workers have higher earnings and better jobs than their less-educated colleagues (Baffour, 2016; Psacharopoulos, 1994). For example, Oreopoulos, Page and Stevens (2003) find that one additional year of secondary education in the United States, Canada and Great Britain reduces unemployment and increases earnings. Harmon et al. (2003) used different databases in England and regression methods to prove that there is an unambiguously positive effect of education on the earnings of individuals. Harmon, Walker and Westergærd (2001) found that in European countries, on average, every additional year of education is linked with an increase of earnings of more than 8%. Woessmann (2015) identified that among those who have a job earnings increase by 7.4% on average for every additional year of education. Finally, a related research focused on Bosnia and Herzegovina suggests that higher education increases the probability of being in higher income categories in this post-conflict economy (Efendic & Pugh, 2018).

The education level of the employee does not only have an impact on their earnings but also shows other benefits such as better working conditions, insurance, access to a company vehicle or childcare (Duncan, 1976; Lucas, 1977; Na, 2021). Highly educated people also have greater opportunities to participate in the labour market and a better chance of finding employment. For example, the unemployment rate for persons with primary education in the EU is almost twice as high as the unemployment rate for persons with secondary education (OECD, 2005a).

Dayioglu and Tunali (2004) examine the differences in education and earnings based on gender. The authors find that since 1982 women have surpassed men in the number of acquired diplomas (Jacobs, 1996). Some studies additionally show that earnings of men and women who are married are significantly higher than of those who are not married (Polachek, 1975). These are influences worth exploring in our sample as well.

Duman (2008) proved that there is an impact of education on the earnings of individuals in Turkey. Generally speaking, socio-economic groups with higher education earn more, both on average and in the entire sample. De Castro (2013) also finds that in many European countries, public sector employees have higher earnings than private sector employees. This uncorrected divide in countries can be partially explained by better attributes of public sector employees, such as better education or greater work experience. In addition, Psacharopoulos and Velez (1993) found a strong

[3] https://www.consilium.europa.eu/ueDocs/cms_Data/docspressData/en/ec/00100-r1.en0.htm

positive interaction between formal and informal education in determining the earning level. They discovered that informal education affects only the earning of workers with at least eight years of formal education.

One of the most important issues in the European transition countries is related to the necessary support of high quality of education for the population. Apart from the challenges of the global market competition and the need to reshape its economy, BiH is also facing demands to meet the criteria for EU membership. The process of EU integration demands that BiH develop its education system in order to create a highly-qualified labour force capable of competing with employees from other EU member states. This review leads to the conclusion that the literature is very consistent in the finding that education has positive effects on the earnings of individuals, both in developed and less developed countries.

Education system in Bosnia and Herzegovina

The institutional environment in BiH has been established through the Dayton Peace Agreement in 1995, which was successful in ending the Bosnia war (1992-1995), but also it generated an institutional environment that is recognized by its complexity and often questionable efficiency (Efendic et al., 2011). Consequently, informal institutions and informal practices in this society are widely present (Efendic & Ledeneva, 2020), with the size of the informal economy estimated at around 30% of GDP (Pasovic & Efendic, 2018).

Institutional complexity applies also to the education system in BiH, which is currently very decentralised between two entities and one district that compose Bosnia and Herzegovina (Federation of BiH, Republika Srpska and the District Brcko of BiH). The jurisdiction over the education system in Federation BiH is decentralized to the cantonal level, and it falls under ten cantons, including the entity level in the Republika Srpska entity and additional jurisdiction in the Brko District of BiH. The complexity of the political system and administrative structure of BiH has an impact on the financing of the education system as well.

The education system in BiH is divided into four levels (pre-primary, primary, secondary and higher education). When it comes to the number and state of schools, there were 332 pre-primary schools with 25,889 students in the 2017/18 academic year. Compared to the previous academic year, the number of pre-schools was reduced by 3.3%, enrolled children increased by 3.9% and the number of employees increased by 5%. There were 282,946 students enrolled in 1,817 primary schools, which is 4,738 students or 1.7% less than in the previous year. The 311 secondary schools in BiH had 124,148 enrolled students. In the 2017/18 academic year, there were 12,591 teachers. A total of 93,984 students enrolled in the first cycle of higher education, including the integrated studies, in the winter semester of 2017/18. Out of this number, 82,926 were enrolled in all years of studies, and 11,058 were graduates. In 2017, 14,583 students graduated/completed their academic or vocational studies, which was 4.5% less than in 2016. Out of the total number of students who graduated, 58% were female (Agency for Statistics of BiH, 2019).

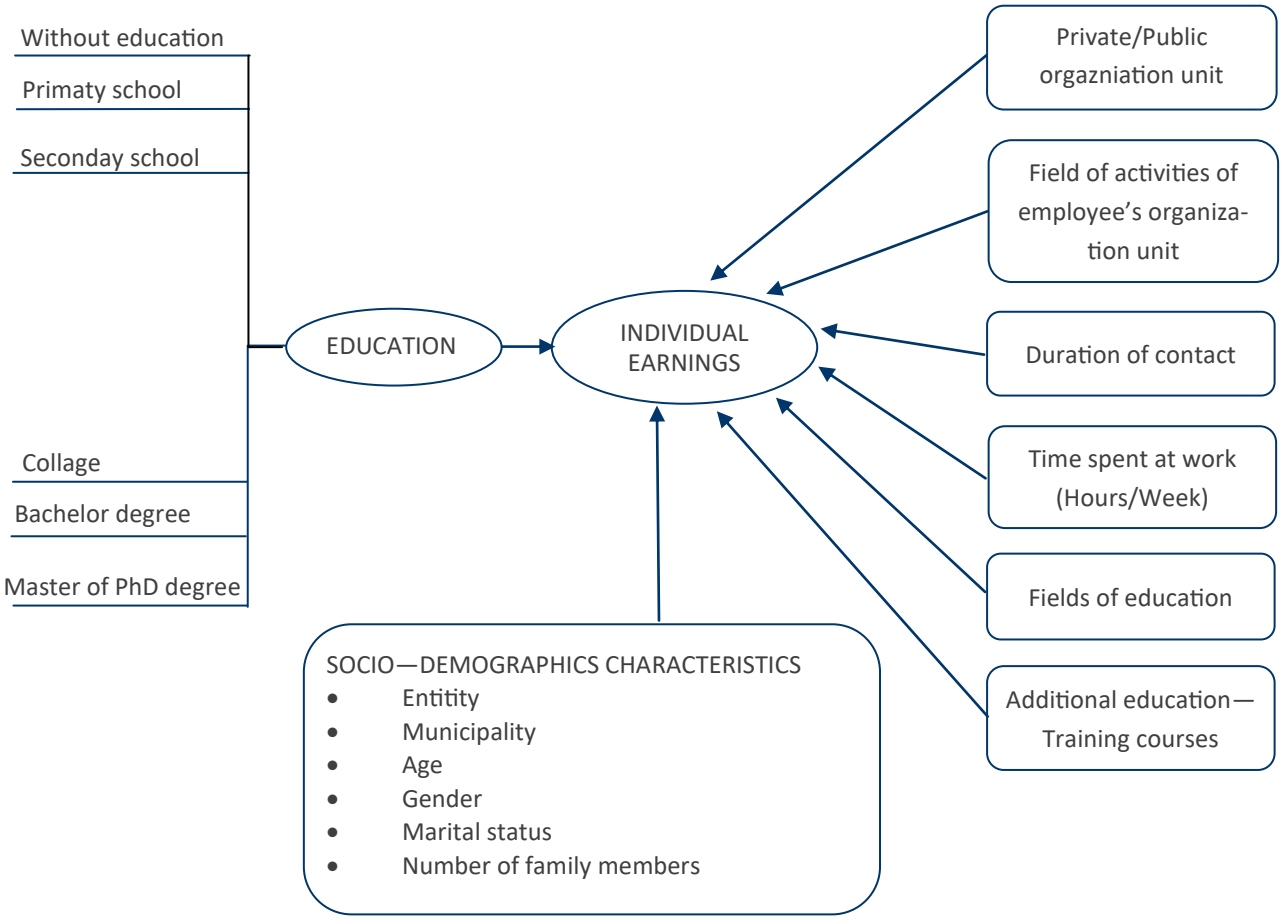
Although BiH has been working on education reform for the past 20 years, a substantial reform happened in primary education by introducing the nine-year education model. In the field of secondary education, reform of vocational training based on a modular teaching approach was launched in 2001 by introducing the EU-VET program. A review of the state of the education system in BiH leads to the conclusion that the decision-makers in this country are aware of changes in the environment and the challenges brought on by these changes to the education system. However, little is being done to modernise the education content, teaching and learning, education technology, management, assessment of attainment, initial training and continuous professional development of teachers at all levels of the education system.

Data and methodology

The period selected for assessment of the effect of education on the earnings of individuals is 2018 and the data from the Labour Force Survey (LFS). The Survey provides information on demographics, education and other characteristics of the population, as well as information on employment, unemployment and underemployment, profession, working hours, duration of employment, additional employment, training and professional development, job search, payment, level of education and age. The following variables were selected for our research as relevant: education, field of education, additional education-training courses, entity, gender, age, marital status, number of family members, private/public organisation unit, time spent at work (hours/week), duration of contract, description of activities of employee's organisation unit, individual

earnings. The variable 'individual earnings' is the dependent variable and the others are independent. The established theoretical model is visually presented in Diagram 1.

Diagram 1: The effect of education on inidividual earnings in BiH



Source: Authors.

The challenge we encountered during the research was the relatively small number of survey subjects who were willing to share the exact amount of their earnings. Fortunately, a significant number of respondents were willing to express the amount of their earnings in intervals, so we solved this problem of missing data by entering the interval midpoint as earning amount. In our sample, the average net monthly earnings of survey subjects were BAM 856.80 (BAM denotes BiH currency, *Konvertibilna marka*, with the fixed exchange rate 1.95 BAM=1 Euro). The average additional monthly payments were BAM 148.38, and the average annual additional earnings of survey subjects amounted to BAM 483.30.

Variables and model specification

In most empirical studies (e.g. Campos & Jolliffe, 2007; Card, 1999; Dayioglu & Tunali, 2004; Duman, 2008; Duncan, 1976; Heckman et al., 2003; Hisarciklilar & Ercan, 2005; Lemieux, 2003; Lucas, 1977; Mincer, 1974) the dependent variable is defined as the earnings (y_i) of an individual (i), in form of the natural logarithm ($\ln(y_i)$) of earnings. The dependent variable in our model specifications is also the natural logarithm of earnings of an individual (*ln_earn*). Descriptive statistics and short elaboration of the dependent and all independent variables that we use in Equation (1) are available in Appendix 1.

The independent variables are: categories of education - primary school (*ed_prim*), third degree of high school (*ed_highschool3)*, forth degree of high school (*ed_highschool4),* fifth degree of high school (*ed_highschool5),* college degree (*ed_collegue*), university MSc degree (*ed_university_I*), university master degree (*ed_university_II*), university PhD degree (*ed_university_III*). We also include other relevant controls identified in the literature and those specific to BiH, namely: entity (*ent*), gender (*gen*), age (*age*), marital status (*marr*), number of family members (*fam_memb*), private/public organisation unit (*org*), time spent at work (*time_work*), duration of contract (*contr*), additional education-training courses (*add_ed*), field of education – 12 categories *(ed_field2,...,ed_field12)* and description of activities of employee's organisation unit – 21 categories (*org_activity2,..,org_activity21*).

The relationship between the level of education and the level of earnings of individuals we estimate following the Mincer's earnings equation (Mincer, 1974) modified to BiH data:

$$ln(y_i) = \alpha_0 + \rho \cdot Educ_i + \beta_1 \cdot Exp_i + \beta_2 \cdot Exp^2{}_i + X \cdot \vartheta_i + \varepsilon_i$$

In Equation (1):

$\ln(y_i)$ is the logarithm value of an individual's earnings (y_i)

$Educ_i$ = level of education of an individual "$_i$",

ρ = vector of estimated coefficients that measure the difference in earnings between different levels of educations when other characteristics are constant,

Exp_i– is the experience of respondents proxied by their age,

β_1 and β_2 – estimated coefficients which singly (β_1) or in combination ($\beta_1+\beta_2$) measures the effect of experience on earnings,

X = vector of variables, including field of education, duration of contract, time spent at work (h/week), work in the public or private sector, description of activities, attending training courses, and vector of socio-demographic characteristics (entity, gender, marital status, number of family members),

θ_i= vector of estimated coefficients that measure the impact of each independent variable from vector *X*,

ε_i= represents the stochastic error term with standard characteristics.

The main goal of this equation is to determine whether the dependent variable, used as logarithm value of an individual's earnings (y_i), depends on relevant determinants expressed by the level of education, experience and other controlled influences from vector X. The listed parameters in the Mincer equation are estimated using the method of Ordinary Least Squares (OLS), as OLS was favoured by statistical tests.

Estimation and discussion of results

The results obtained in this research strongly suggest that there is a systematically positive effect of a higher level of education on the earnings of individuals in BiH, both in the form of higher earnings and in the form of additional income. An interesting finding is that the first education category for which this effect is tested was primary and third level of secondary education, for which no statistical difference in the earnings was found. The effect becomes visible starting with level 4 secondary education. Also, it is interesting to observe that there is a perfect regularity, i.e. that with every new level of education, the earnings grows progressively and all higher levels of education are statistically significant (see Table 1).

Table 1: The effect of education on an individual's earning in BiH – OLS estimate

Name of variable	Mincer's regression model Dependent variable is *ln_earn*			
	Model 1	Model 2	Model 3	Model 4
	Coeff.	Coeff.	Coeff.	Coeff.
ed_highschool4	0.09***	0.09***	0.09***	0.09***
ed_highschool5	0.26***	0.26***	0.26***	0.26***
ed_collegue	0.36***	0.36***	0.36***	0.36***
ed_university_I	0.50***	0.50***	0.50***	0.50***
ed_university_II	0.70***	0.70***	0.70***	0.70***

ed_university_III	0.84***	0.84***	0.84***	0.84***
add_edu	0.15**	0.15**	0.15*	0.15*
age	0.004***	0.01**	0.004***	0.01**
age2	-	-0.0001*	-	-0.0001*
org	0.07***	0.07***	0.07***	0.07***
ent	0.22***	0.22***	0.22***	0.22***
gen	0.17***	0.17***	0.17***	0.17***
fam_memb	0.02***	0.02***	0.02*	0.02**
marr	0.02	0.006	0.02	0.006
contr	0.22***	0.22***	0.22***	0.22***
time_work	0.006***	0.006***	0.006***	0.006***
ed_field2	-0.07*	-0.07	-0.07	-0.07
ed_field3	-0.16**	-0.16**	-0.16**	-0.16**
ed_field4	-0.10***	-0.10***	-0.10*	-0.10*
ed_field5	-0.07**	-0.07**	-0.07	-0.07
ed_field6	-0.12***	-0.13***	-0.12**	-0.13**
ed_field7	-0.04	-0.05	-0.04	-0.05
ed_field8	-0.07***	-0.07***	-0.07*	-0.07*
ed_field9	0.03	0.03	0.03	0.03
ed_field10	-0.04	-0.04	-0.04	-0.04
ed_field11	-0.10***	-0.10***	-0.10**	-0.10**
ed_field12	-0.07	-0.07	-0.07	-0.07
org_activity2	0.45***	0.45***	0.45***	0.45***
org_activity3	0.20***	0.21***	0.20*	0.21*
org_activity4	0.51***	0.51***	0.51***	0.51***
org_activity5	0.18***	0.18***	0.18	0.18
org_activity6	0.42***	0.42***	0.42***	0.42***
org_activity7	0.20***	0.20***	0.20*	0.20*
org_activity8	0.34***	0.34***	0.34***	0.34***
org_activity9	0.12**	0.13**	0.12	0.13
org_activity10	0.33***	0.33***	0.33**	0.33**
org_activity11	0.44***	0.44***	0.44***	0.44***
org_activity12	0.21	0.22	0.21	0.22
org_activity13	0.22***	0.22***	0.22**	0.22*
org_activity14	0.20***	0.20***	0.20*	0.20
org_activity15	0.42***	0.42***	0.42***	0.42***
org_activity16	0.21***	0.21***	0.21*	0.21*
org_activity17	0.41***	0.41***	0.41***	0.41***
org_activity18	0.26***	0.26***	0.26*	0.26*
org_activity19	0.21***	0.22***	0.21*	0.22*
org_activity20	0.67*	0.70*	0.67***	0.70***
org_activity21	0.68***	0.68***	0.68***	0.68***
Municipal effects (123)	-	-	Yes	Yes
Number of observations	3272	3272	3272	3272
F - test	Prob > F = 0.000	Prob > F = 0.000	Prob > F = 0.000	Prob > F = 0.000
R- squared	0.34	0.35	0.34	0.35

Mean Variance Inflation Factor (VIF)	2.04	4.58	2.04	4.58
Ramsey RESET test	0.1350	0.1847	0.1350	0.1847
Breusch-Pagan / Cook-Weisberg test	0.2226	0.2375	-	-
Statistical significance: 1% denoted as ***, 5% as **, 10% as *.				
Model 1: Mincer's regression model (Model) with effect of education on an individual's earning in BiH (base category–an individual has a primary or secondary school, III degree). Model 2: Model with effect of education on an individual's earning in BiH with age squared variable. Model 3: Model with effect of education on an individual's earning in BiH with cluster- robust standard errors, municipalities used as clusters. Model 4: Model with effect of education on an individual's earning in BiH with age squared variable and cluster-robust standard errors, municipalities used as clusters.				

Source: Authors, STATA14.

All four models that we report in Table 1 have very similar outcomes and appropriate model diagnostics. We interpret Models 1-2, while the remaining Models 3 -4 are used to check stability of the results with clustered estimates. The Ramsey test for functional form obtained p-value above 10% level in all specifications, suggesting a proper functional form. The models also do not indicate problems with heteroskedasticity (p-value of the Breusch-Pagan/Cook-Weisberg test is above 0.2 in all cases) nor multicollinearity (acceptable level of VIF factor). Based on this, we concluded that the estimates are statistically valid and that we can interpret the obtained coefficients of this model (see Table 1).

The obtained results indicated that individuals with level 4 secondary education have 9% higher earnings, with level 5 secondary education 26% higher earnings, with post-secondary education 36% higher earnings, with 1st cycle of studies 50% higher earnings, with 2nd cycle of studies 70% higher earnings and, finally individuals with 3rd cycle of studies have 84% higher earnings than individuals with level of education lower than level 4 secondary education (base category). The results indicate a clear pattern and positive effects of higher regular education on income. Accordingly, we can conclude that investment in a higher level of education generates return in the form of higher earnings.

It is also very important to emphasise the result we obtained regarding the additional education and training of individuals. There is a strong positive effect of additional training on the earnings of individuals. The individuals who attend additional training earn around 15% more than individuals who do not attend additional training. Simply put, investment in additional training, acquiring of new skills and specialisation, apart from statutory education, also lead to a systematic positive effect in the form of increased earnings.

The change in age (older age by a year) results in an increase of the earnings of individuals by 0.4%, which is in line with Mincer's theory (Model 1). However, the squared term of age (Model 2) is statistically significant at 10% and negative, suggesting that the positive effect of increasing experience on earnings starts to diminish later.

The next interesting finding is about the difference between the public and the private sector. Results indicate that workers employed in the public sector also have systematically higher earnings than workers in the private sector of about 7%. This partly might be the reason for a greater interest for the public sector employment over the private, not forgetting some other benefits that might be found in the public but not in the private sector (e.g. greater security for jobs).

The other related findings are not in our primary focus, but we will shortly explain the effects of other controlled variables. For example, individuals who work more than 40 hours per week have 0.6% higher earnings than individuals who work fewer hours. We also find that individuals who live in the Federation of BiH entity report around 22% higher earnings than individuals who live in the Republika Srpska entity. In addition, men in BiH have 17% higher earnings than women, and the change in number of family members (an additional family member) leads to an average increase of the individual earnings of about 2%. Finally, we have done a number of robustness checks, which included specifications with age squared, with cluster-robust standard

errors, specifications in which the municipality is controlled for, and finally, specifications with different dependent variables explained above. In all these examples, the main results do not change with some slight differences between different models, suggesting stability of the results and our conclusions on the positive effect of education.

Conclusion

The institutional framework for the development of the education system in BiH is very complex and costly. Competencies of many ministries, different agencies and institutions overlap, which makes any attempt of a systematic approach to education reform demanding. Still, reform of curriculums and reform of teacher training are hardly needed reforms in all parts of BiH.

A small country with limited resources such as BiH can successfully build its prosperity by developing an economy based on knowledge, technology and innovation. This paper, to our knowledge, is the first one measuring the impact of education on the earnings of individuals in BiH. Collecting data on education and earning of individuals is always a challenging task, considering the fragmentation of the education system and limited statistical capacities in BiH. Thus, we decided to rely on relevant data from the Labour Force Survey (2018) to conduct our empirical investigation. Aside from the influence of education on earnings, we have also identified other relevant factors which affect the earnings of individuals in BiH, such as socio-demographic characteristics, private/public organisation units, time spent at work (h/week), contract duration and description of activities of the organisation unit of employees. In this way, we were able to observe not only education, but also other relevant influences confirmed in the literature.

The results of our empirical research are mainly in line with the findings of earlier studies conducted in different countries. We find a systematically positive effect of a higher level of education on the earnings of individuals, both in the form of higher earnings and the additional income they generate. From the aspect of the economic interpretation of the results, the change in the level of education from primary to level 4 secondary education leads to a 9% increase of earnings of an individual, with a progression that is identified for every higher level of education. Moreover, individuals with additional training earn 15% more than individuals without additional training, suggesting that life-long-learning oriented individuals have positive benefits in terms of higher earnings. Simply, although the system of education in BiH is far from an ideal, still it has positive consequences for society and for individuals participating in different educational programs.

Such findings confirm the importance of human capital in increasing productivity, which is especially important for BiH in the context of a decreasing population and strong emigration trends that have existed over the last decade (Efendic, 2016, 2021; Williams & Efendic, 2019).

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Appendix 1

Table 2: Definitions, constructions and descriptive statistics of variables

Variables	Variable label	Explanation of variables	Sample (5311 observations)				Statistical significance
			Number of observations	"Do not know" in %	Mean	Standard deviation	
The logarithmic amount of an individual's net monthly earning	*ln_earn*	Logarithmic value of an individual's earning (BAM)	3924	26.00	6.604	0.539	Yes
Education level: High school, four years	*ed_highschool4*	Secondary education degree, four years: 1-yes; 0-other	5311	0.00	0.359	0.480	Yes
Education level: High school, five years	*ed_highschool5*	Secondary education degree, five years: 1-yes; 0-other	5311	0.00	0.013	0.115	Yes
Education level: College	*ed_college*	College education degree: 1-yes; 0-other	5311	0.00	0.038	0.190	Yes
Education level: University, bachelor degree	*ed_university_I*	University education degree, three years: 1-yes; 0-other	5311	0.00	0.109	0.311	Yes
Education level: University, master degree	*ed_university_II*	University education degree, two years: 1-yes; 0-other	5311	0.00	0.017	0.128	Yes
Education level: University, PhD degree	*ed_university_III*	University education degree, three years: 1-yes; 0-other	5311	0.00	0.003	0.058	Yes
Additional education	*add_edu*	Additional education of the respondents (attending the course): 1-Yes; 0-No	5311	0.00	0.009	0.097	Yes
Age	*age*	Age of respondents in years: 18-min; 65-max	5311	0.00	43.315	11.935	Yes

Kind of organization unit	*org*	Kind of workers organization unit 1- public; 0- other	4978	6.27	0.316	0.465	Yes
Entity	*ent*	Geographic area: 1- FBiH; 0-RS	5311	0.00	0.610	0.488	Yes
Gender	*gen*	Gender: 1-male; 0-female	5311	0.00	0.642	0.479	Yes
Number of family members	*fam_memb*	Number of family members: 1-min...11-max	5311	0.00	3.665	1.398	Yes
Marital status	*marr*	Marital status: 1- married; 0-other	5311	0.00	0.686	0.464	No
Duration of employment contract	*contr*	Permanent or temporary job of the respondents: 1-indefinite working hours; 0-fixed working hours	4223	20.49	0.839	0.367	Yes
Hours spent at work	*time_work*	Hours spent at work	5013	5.61	42.918	8.019	Yes
Field of education: General program and qualifications	*ed_field 1*	Field of education: 1-General program and qualifications; 0-other	4575	13.86	0.111	0.315	Yes
Field of education: Education	*ed_field 2*	Field of education: 1-Education; 0-other	4575	13.86	0.034	0.181	Yes
Field of education: Art and humanities	*ed_field 3*	Field of education: 1-Art and humanities; 0-other	4575	13.86	0.013	0.113	Yes
Field of education: Social studies	*ed_field 4*	Field of education: 1-Social studies; 0-other	4575	13.86	0.067	0.250	Yes
Field of education: Social studies	*ed_field 5*	Field of education: 1-Social studies; 0-other	4575	13.86	0.082	0.274	Yes
Field of education: Science, mathematics and statistics	*ed_field 6*	Field of education: 1-Science, mathematics and statistics; 0-other	4575	13.86	0.028	0.166	Yes
Field of education: IT	*ed_field 7*	Field of education: 1-IT; 0-other	4575	13.86	0.042	0.202	No
Field of education: Engineering, production and construction	*ed_field 8*	Field of education: 1-Engineering, production and construction; 0-other	4575	13.86	0.258	0.438	Yes
Field of education: Agriculture, forestry, fishing and veterinary	*ed_field 9*	Field of education: 1-Agriculture, forestry, fishing and veterinary; 0-other	4575	13.86	0.044	0.205	No
Field of education: Healthcare and social welfare	*ed_field 10*	Field of education: 1-Healthcare and social welfare; 0-other	4575	13.86	0.055	0.228	No

Field of education: Services	*ed_field 11*	Field of education: 1-Services; 0-other	4575	13.86	0.237	0.426	Yes
Field of education: Unknown	*ed_field 12*	Field of education: 1-Unknown; 0-other	4575	13.86	0.028	0.164	No
Activities of organisation unit: Agriculture, forestry and fishing	*org_activity1*	Activities of organisation unit: 1-Agriculture, forestry and fishing; 0-other	5020	5.48	0.110	0.313	Yes
Activities of organisation unit: Mining and quarrying	*org_activity2*	Activities of organisation unit: 1-Mining and quarrying; 0-other	5020	5.48	0.025	0.155	Yes
Activities of organisation unit: Processing industry	*org_activity3*	Activities of organisation unit: 1-Processing industry; 0-other	5020	5.48	0.194	0.395	Yes
Activities of organisation unit: Production and supply of electricity, gas, steam and air conditioning	*org_activity4*	Activities of organisation unit: 1-Production and supply of electricity, gas, steam and air conditioning; 0-other	5020	5.48	0.023	0.151	Yes
Activities of organisation unit: Water supply; wastewater disposal, waste management and remediation activities	*org_activity5*	Activities of organisation unit: 1-Water supply; wastewater disposal, waste management and remediation activities; 0-other	5020	5.48	0.016	0.124	Yes
Activities of organisation unit: Construction	*org_activity6*	Activities of organisation unit: 1-Construction; 0-other	5020	5.48	0.093	0.291	Yes
Activities of organisation unit: Trade	*org_activity7*	Activities of organisation unit: 1-Trade; 0-other	5020	5.48	0.141	0.348	Yes
Activities of organisation unit: Transport and storage	*org_activity8*	Activities of organisation unit: 1-Transport and storage; 0-other	5020	5.48	0.055	0.227	Yes
Activities of organisation unit: Accommodation and food service activities (hotels and restaurants)	*org_activity9*	Activities of organisation unit: 1-Accommodation and food service activities (hotels and restaurants); 0-other	5020	5.48	0.046	0.210	Yes
Activities of organisation unit: IT	*org_activity10*	Activities of organisation unit: 1-IT; 0-other	5020	5.48	0.017	0.129	Yes
Activities of organisation unit: Financial and insurance activities	*org_activity11*	Activities of organisation unit: 1-Financial and insurance activities; 0-other	5020	5.48	0.013	0.113	Yes
Activities of organisation unit: Real estate	*org_activity12*	Activities of organisation unit: 1-Real estate; 0-other	5020	5.48	0.002	0.045	No
Activities of organisation unit: Professional, scientific and technical activities	*org_activity13*	Activities of organisation unit: 1-Professional, scientific and technical activities; 0-other	5020	5.48	0.016	0.124	Yes

Activities of organisation unit: Administrative and support service activities	*org_activity14*	Activities of organisation unit: 1-Administrative and support service activities; 0-other	5020	5.48	0.016	0.126	Yes
Activities of organisation unit: Public administration and defense; compulsory social insurance	*org_activity15*	Activities of organisation unit: 1-Public administration and defense; compulsory social insurance; 0-other	5020	5.48	0.072	0.259	Yes
Activities of organisation unit: Education	*org_activity16*	Activities of organisation unit: 1-Education; 0-other	5020	5.48	0.061	0.240	Yes
Activities of organisation unit: Healthcare and social welfare	*org_activity17*	Activities of organisation unit: 1-Healthcare and social welfare; 0-other	5020	5.48	0.054	0.226	Yes
Activities of organisation unit: Arts, entertainment and recreation	*org_activity18*	Activities of organisation unit: 1-Arts, entertainment and recreation; 0-other	5020	5.48	0.016	0.125	Yes
Activities of organisation unit: Other service activities	*org_activity19*	Activities of organisation unit: 1-Other service activities; 0-other	5020	5.48	0.027	0.163	Yes
Activities of organisation unit: Activities of household as employer	*org_activity20*	Activities of organisation unit: 1-Activities of household as employer; 0-other	5020	5.48	0.002	0.040	Yes
Activities of organisation unit: Activities of extraterritorial organizations and bodies	*org_activity21*	Activities of organisation unit: 1-Activities of extraterritorial organizations and bodies; 0-other	5020	5.48	0.002	0.045	Yes

Source: Authors.