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Human capital and economic growth – evidence from the Balkan region

This study empirically examines the relationship between human capital and economic growth in 8 Balkan countries over the period of 2000–2019. The study considers an array of statistical techniques such as the Generalized Linear Model (GLM) regression, the Driscoll-Kraay approach (D-K), and the System GMM (S-GMM) for data analysis. The study documents the positive and statistically significant impact of human capital on economic development. The analysis of the selected subsample of countries also established the positive role of human capital in shaping economic growth. The findings suggest that policymakers may design a comprehensive human development-related policy to achieve sustainable economic growth, at least in the Balkan region.

Keywords: economic growth, education, human capital

JEL classification: C23, J24, O47

Introduction

The consequences of rapid industrial growth in emerging and developing countries to increase the output without environmental protection have profound effects on human life, health, and environmental sustainability [Ahmed et al., 2021]. Consequently, the world faces critical social, environmental, and economic related issues, which further hinder sustainable economic development [Hunjra et al., 2022]. This situation warrants concentrated efforts to minimize the impact of these unwanted social and environmental-related challenges such as a weak governance mechanism, poverty, unemployment, heat waves, droughts, biodiversity and rising sea levels, and thereby the pursuit of economic growth which is compatible with environmental preservation and social sustainability [Ahmed et al., 2022]. Keeping in view the importance of economic growth in view of these challenges, several recent studies have remained focused on how to achieve economic growth through information communication technology (ICT), institutional quality, trade openness, foreign finance, financial development, and

financial inclusion [Acheampong et al., 2020; Appiah-Otoo, Song, 2021; Le et al., 2019; Ozturk, Ullah, 2022; Zakaria, Bibi, 2019].

Despite its importance, the previous literature has remained less focused on how to achieve economic growth through human development [Keji, 2021]. Human resource plays a critical role in driving economic development and technological progress. It is economic growth unsupported by adequate human capital, which leads to poor company performance, negligence of environmental and social impacts, poor decision-making, and other negative effects resulting from low skills and the lack of competences of employees both in private and public sectors.

Human capital describes growth in educational attainment or an improvement in human intellectual capacity. The investment in education leads to a more productive and innovative workforce, which in turn leads to the creation of new ways of doing things to achieve sustainable economic development. The existing literature established a bi-directional human capital and economic growth nexus [Han, Lee, 2020; Opoku et al., 2022]. For instance, human capital develops an efficient workforce, which further contributes to economic development. In turn, growth provides new opportunities to improve human capital [Okunade et al., 2022; Shidong et al., 2022]. Empirically, several studies such as Keji [2021], Siddiqui and Rehman [2017], and Ogundari and Awokuse [2018] supported the positive role of human capital in shaping economic growth. In contrast, Ma [2021], Benhabib and Spiegel [1994], and Filmer and Pritchett [1999] established an insignificant or negative human capital and economic growth relationship. Thus, the extant empirical research provides inconclusive results regarding human capital and economic growth. Eventually, this contradictory evidence creates a need to understand this relationship in-depth through more examples, preferably with data-based research and appropriate econometric techniques.

This study's contributions to the economic research are twofold. Firstly, this study contributes to investigating the relationship in the Balkan Region, since previous studies are conducted in an individual country or different regions. For instance, Ogundari and Awokuse [2018] focused on the human capital-economic growth nexus in Sub-Saharan African countries. Similarly, Teixeira and Queirós [2016] explain this phenomenon in the OECD region, and Siddiqui and Rehman [2017] in Asian countries. However, Balkan countries as a region are less focused on in the current literature. Therefore, this study considers Balkan countries as a sample region in order to fill this research gap. At the same time it is an interesting example due to the following reasons: (1) The rate of macroeconomic growth of Balkan countries' economies has been expected to increase at a higher pace than well-established economies due to their massive natural resources, largely not used during the past decade; (2) The World Bank reported a significant growth increase in the Balkan region in 2021 and observed future economic expansion. Hence, the GDP growth rate in the western Balkans reached 7.4% in 2021, compared to 3.2%

in 2020, a significant difference from other post-COVID-19 economies of the world. However, there is a need to bring structural reforms to improve productivity, the competitive environment, good governance, and human development strategies. Hence, in light of the above discussion, this study examines human development's impact on economic growth to provide better insights to policymakers. We propose the following research questions:

RQ1: Does human capital contribute significantly to economic growth in the Balkan region?

RQ2: Does the impact of human capital on economic growth vary across the listed Balkan countries?

Secondly, previous studies on human capital's relation to economic growth, such as those of Ogundari and Awokuse [2018] and Siddiqui and Rehman [2017] have largely ignored the issues of cross-sectional dependencies, serial correlation, and heteroscedasticity. Moreover, the application of different traditional econometric techniques for data analysis has also created challenges for comparing research completed by different scholars. It could be argued that the use of the traditional Maximum Likelihood (ML) method in those studies, which requires a complete specification of the model that is considered to be estimated, is not adequate for the Balkans. This is especially due to the fact that the probabilities of the distributions of variables of interest are not always fully known because of poor data reporting and quality. Therefore, this study applies generalized linear (GLM) regression and the Driscoll-Kraay approach (D-K) to address the issues of cross-sectional dependencies, serial correlation, and heteroscedasticity. Further, we applied system GMM for a robustness check to provide useful and robust insights into policymakers on this topic.

The rest of the paper is built as follows: the literature review and hypothesis development related discussion are provided in section 2. Sections 3 and 4 present the research methodology and analysis, respectively. Section 5 concludes the study.

1. Literature review

Human capital theory suggests that the role of human capital is essential for economic development [Wang et al., 2022]. Progress in the economy can only be sustained in the case where the human capital is continually built up [Aghion, Howitt, 1998]. Further, Paul Romer devised this growth model to give an endogenous explanation of the source of technological advancement, meaning that an economy that has more human capital would expand faster. Existing research has mainly focused on education that impacts economic growth [Appiah-Otoo, Song, 2021]. The literature strongly claims that the most efficient and productive people are likely to be highly educated [Han, Lee, 2020]. Moreover, to invest their services,

highly qualified personnel can come up with multiple creative ideas to achieve sustainable economic growth [Han, Lee, 2020]. Based on data from 132 countries with a research period of 15 years, Ali et al. [2018] suggested that human capital had the potential to have a positive impact on the GDP per capita, with economic prospects and high-quality legal systems having an additional positive influence on this effect. Deng and Long [2017] examined a panel data analysis for 30 provinces in eastern China and reported that innovative human capital influences economic growth through technological innovation. Reza and Widodo [2013] studied the impact of workers' average level of education on economic growth and found a positive and significant relationship between human capital and economic growth. Siddiqui and Rehman [2017] evaluate the effects of the skills and abilities of the workforce on economic growth. They concluded that greater reliance on primary and secondary education in East Asian countries, compared to the benefits of higher education in developing countries, is required to achieve a transformation in economic growth in these countries. In a study of Nigeria, Keji [2021] concluded that both the education and the health sectors had a positive impact on productivity. The study used the vector autoregressive and Johansen approaches to address this occurrence and found that human capital has a significant long-term impact on Nigeria's economic growth. In Pakistan, Abbas and Nasir [2001] concluded that secondary and tertiary education greatly influenced economic growth. According to Self and Grabowski [2004], the economy relies heavily on the quality of primary education in India. Likewise, Li and Liang [2010] suggested a link between a primary education system and a growing economy.

However, endogenous growth theory supports typically the two-way causal association of human capital with economic development. Empirically, Siddiqui [2006] concluded that human capital is a necessary component of the South Asian economic development. Likewise, Ogundari and Awokuse [2018] investigated the long-run dynamic relationship between human capital and economic progress in 35 Sub-Saharan African countries from 1980–2008. They used the system generalized method of moments (SGMM) and balanced panel data to observe the results and found a positive association between human capital and economic growth. Zhang and Zhuang [2011] examined this human capital and economic progress nexus in dynamic panel framework settings. They gathered data from 31 provinces of China from 1997–2006 and found that human capital efficiency can increase sustainable economic growth. Moreover, Wang et al. [2022] discovered that an efficient workforce has a major impact on economic growth in China. Another study by Teixeira and Queirós [2016] used panel data analysis to observe the dynamic relationship between these two variables in OECD countries and supported the positive relationship between economic growth and human capital.

Finally, the third strand of literature established either a negative or no relationship between human capital and economic growth. Benhabib and Spiegel [1994] found that there was no association between human capital development and GDP growth. Moreover, Filmer and Pritchett [1999] examined the sample data on the educational system and concluded that it had no impact on the economic progress. Ma [2021] explored this effect by looking at it in the context of the dynamics of human capital on economic progress and established the negligible role of human development on economic progress. Amassoma and Nwosa [2011] used techniques such as vector error correction and pairwise Granger causality and found an insignificant relationship between human capital and economic growth.

Hence, in light of the above somewhat contradictory theoretical and empirical studies, we will test the following hypothesis.

H1: Human capital is positively associated with the economic development of Balkan countries.

2. Literature gap

Human capital and economic growth are endogenous in nature. An efficient labour market enables sustainable economic growth, whereas the economic growth model brings new opportunities and chances to sustain human capital. Therefore, it is essential to synchronize these two variables and understand the nature of this relationship. While previous literature helps to understand the impact of human capital on economic growth, there is still a need to find significant factors that affect this relationship. Another reason to conduct the current study is to bridge the contextual gap because previous researchers who have developed results based on sample data primarily from large developing countries. The present study will focus on the Balkan region to investigate the relationship between human capital and economic growth in a number of significantly smaller economies with the goal of providing a better insight for policymakers on this topic.

3. Research methodology

This study examines the impact of human capital on economic development through an array of panel statistical techniques such as generalized linear regression in order to obtain consistent coefficients. Following Le et al. [2020], this study also applies the widely known technique of the Diskoray model and uses system GMM as a robustness check to produce consistent and reliable results even

in the presence of cross-sectional dependence and endogeneity. The baseline model of this study is as follows:

$$EG_{i,t} = \delta_0 + \delta_{i,t} HC_{i,t} + \sum_{t=1}^{t=\eta} \delta_{i,t} Controls_{i,t} + \varepsilon_{i,t} \quad (i)$$

where $EG_{i,t}$ stands for economic growth, $HC_{i,t}$ represents the human capital (It constructed via three dimensions: healthy life, access to knowledge and standard of living). The control variables include a set advocated by several previous studies [Opoku et al., 2022; Pradhan et al., 2013] and consisting of ICT (measured by number of mobile subscribers per 100 people), industry (industry value added as its share of GDP) and inflation (consumer prices annual percentage change). The selection of this set of control variables helps to examine the role of education against other significant factors which impact modern economic growth. While the selection of factors in economic growth models is a subject of fierce discussions in the economic community, the reason for following ICT, industry and inflation is supported by several recent empirical studies, which have advocated the substantial contribution of the aforementioned variables in shaping sustainable economic development in less complex economies [Nchofoung, Asongu, 2022; Le et al., 2020].

3.1. Research design

The study performed the data analysis in three steps. First, the study estimated the descriptive statistics. In the second step, the study produced a correlation matrix. In the third step, the study analysed the impact of human capital on economic growth via the GLM model. Further, the human capital and economic growth nexus was also examined via Diskoray and system GMM for further robustness [Le et al., 2020].

3.2. Sample details

The study collected the data from 2000 to 2019 on economic growth, human capital, and other macro-economic variables from the IMF and World Bank websites for 8 Balkan countries, namely Albania, Bulgaria, Croatia, Greece, Romania, Serbia, Slovenia, and Turkey.

4. Data analysis

4.1. Descriptive statistics

The summary statistics are reported in Table 1. The economic growth has a mean value of 10,405, which is greater than the mean reported values of a similar study of developing economies by Renzhi and Baek [2020]; the difference between

Table 1. Summary statistics

Variable	Symbol	Definition	Obs	Mean	SD	Min	Max	Reference
economic growth	EG	GDP per capita (constant 2010 USD)	160	10,405	6,373.69	1,960.88	24,073	Renzhi, Baek, 2020
human capital	HC	constructed via three dimensions: a healthy life, access to knowledge and standard of living	160	2.995	0.356	1.997	3.619	Opoku et al., 2022
information and communications technology	ICT	mobile subscribers (per 100 people)	156	92.096	32.073	0.952	146.997	Nchofoung, Asongu, 2022
industry	IND	industry (including construction), value added (% of GDP)	160	25.183	5.061	13.328	38.695	Le et al., 2019
inflation	INF	inflation, consumer prices (annual %)	160	6.806	12.327	-4.298	95.005	Pradhan et al., 2013

Source: Own elaboration.

mean values is attributed to the sample size of both studies. The human capital has a mean value of 2.995 which is lower than the reported mean value of Opoku et al. [2022], suggesting Balkan countries have lower human capital in comparison to other regions. This could be easily explained by the use of large countries in other studies. On the other hand, the development of the education system in the Balkans could be argued as being better than in large developing countries. As far as control variables are concerned, the ICT had the highest mean and standard deviation values ($M = 92.096$, $SD = 32.073$) among the control variables.

4.2. Correlation matrix

The correlation matrix is presented in Table 2. The positive coefficient values exist between human capital and ICT, which are also positively associated with economic development in Balkan countries. Furthermore, while ICT is positively correlated with economic development, industry and inflation are negatively correlated. These coefficients of control variables are statistically significant at 1.00%.

Table 2. Correlation matrix

	EG	HC	ICT	IND	INF
EG	1.00	–	–	–	–
HC	0.42***	1.00	–	–	–
ICT	0.32***	0.45***	1.00	–	–
IND	–0.26**	–0.08	–0.13	1.00	–
INF	–0.24**	–0.51***	–0.50***	0.28***	1.00

Notes: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Source: Own elaboration.

4.3. Regression analysis

The research examines the effect of a predominant factor such as human capital on economic growth in the Balkan countries. Additionally, the study considered control variables such as ICT, industry, and inflation. The regression results of the GLM are reported in table 4. The regression results of the GLM, D–K and GMM are presented in Tables 3, 4 and 5, respectively. These results indicate that human capital has a statistically significant positive coefficient value. The beta value suggests that human capital has a positive ($\beta_{HC} = 0.434$, $p < 0.001$) effect on economic progress in Balkan countries. Thus, the results reveal the presence of skilful labour positively contributes to economic development. Teixeira and Queirós [2016] also concluded the positive relationship of human capital with economic development. Likewise, Keji [2021] also established the long and short-run

Table 3. Impact of human capital on economic growth (GLM model)

	Full sample	Romania	Greece	Bulgaria	Croatia	Slovenia	Serbia	Albania	Turkey
	EG	EG	EG	EG	EG	EG	EG	EG	EG
HC	0.434***	4.751***	2.400***	-0.0631	1.283***	0.843**	0.697***	0.0538	0.812***
	(0.153)	(0.415)	(0.237)	(0.177)	(0.333)	(0.383)	(0.0826)	(0.293)	(0.0668)
ICT	0.00657***	0.000737	0.000889**	0.00472***	0.00150**	0.00370***	0.00214***	0.00685***	0.00148***
	(0.00170)	(0.000494)	(0.000437)	(0.00122)	(0.000629)	(0.00112)	(0.000715)	(0.00245)	(0.000526)
IND	-0.0207**	0.00258	0.00730	0.0330**	0.0660***	-0.0147**	0.00800	0.0223*	0.0347***
	(0.00956)	(0.00428)	(0.00911)	(0.0138)	(0.0248)	(0.00736)	(0.0108)	(0.0125)	(0.00471)
INF	0.00982	-0.00249	0.00802***	0.0278**	0.00641	-0.00211	0.00319	-0.000645	-0.00179***
	(0.00669)	(0.00358)	(0.00255)	(0.0108)	(0.00821)	(0.00177)	(0.00292)	(0.00885)	(0.000574)
Constant	7.634***	-5.789***	1.052	9.026***	3.992***	6.483***	5.913***	8.400***	6.270***
	(0.505)	(1.196)	(0.864)	(0.750)	(1.452)	(1.314)	(0.489)	(0.917)	(0.0954)
No. of countries	8,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000

Notes: Standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1.

Source: Own elaboration.

Table 4. Impact of human capital on economic development (Dricoll–Kraay approach)

	Full sample	Romania	Greece	Bulgaria	Croatia	Slovenia	Serbia	Albania	Turkey
	EG	EG	EG	EG	EG	EG	EG	EG	EG
HC	0.434***	4.751***	2.400***	-0.0631	1.283***	0.843**	0.697***	0.0538	0.812***
	(0.0507)	(0.322)	(0.215)	(0.209)	(0.434)	(0.401)	(0.0981)	(0.376)	(0.0524)
ICT	0.00657***	0.000737	0.000889**	0.00472***	0.00150*	0.00370***	0.00214**	0.00685**	0.00148***
	(0.00190)	(0.000463)	(0.000371)	(0.00148)	(0.000819)	(0.00124)	(0.000958)	(0.00321)	(0.000487)
IND	-0.0207***	0.00258	0.00730	0.0330***	0.0660**	-0.0147**	0.00800	0.0223	0.0347***
	(0.00637)	(0.00620)	(0.00609)	(0.00844)	(0.0267)	(0.00566)	(0.0113)	(0.0151)	(0.00481)
INF	0.00982***	-0.00249	0.00802***	0.0278***	0.00641	-0.00211	0.00319	-0.000645	-0.00179***
	(0.00255)	(0.00233)	(0.00268)	(0.00710)	(0.00985)	(0.00151)	(0.00328)	(0.00977)	(0.000494)
Constant	7.634***	-5.789***	1.052	9.026***	3.992**	6.483***	5.913***	8.400***	6.270***
	(0.218)	(0.989)	(0.733)	(0.671)	(1.779)	(1.281)	(0.412)	(1.006)	(0.0840)
R-squared	0.219	0.986	0.988	0.732	0.871	0.976	0.965	0.819	0.994
No. of groups	8.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000

Notes: Standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1.

Source: Own elaboration.

Table 5. Impact of human capital on economic growth (system GMM model)

	Full sample	Romania	Greece	Bulgaria	Croatia	Slovenia	Serbia	Albania	Turkey
	EG	EG	EG	EG	EG	EG	EG	EG	EG
L1_gdp	0.967*** (0.0104)	0.908*** (0.0679)	0.677*** (0.140)	0.996*** (0.0860)	0.809*** (0.164)	0.655*** (0.231)	0.891*** (0.209)	0.824*** (0.114)	-0.137 (0.132)
	0.0819*** (0.0274)	0.549 (0.344)	0.826** (0.337)	0.240*** (0.0598)	0.405 (0.254)	0.00969 (0.372)	0.155 (0.135)	0.127 (0.203)	0.971*** (0.128)
hc	0.000644*** (0.000103)	0.000465*** (0.000159)	-3.84e-05 (0.000251)	-0.000365 (0.000727)	0.000837* (0.000491)	0.00182 (0.00139)	0.000285 (0.000584)	0.00116 (0.00213)	0.00194*** (0.000607)
	0.00135** (0.000545)	0.00211 (0.00152)	-0.000439 (0.00389)	0.0275*** (0.00514)	0.0174 (0.0155)	-0.0130** (0.00648)	0.0216*** (0.00670)	0.0227*** (0.00586)	0.0330*** (0.00437)
Inflation	-1.38e-06 (0.000603)	-0.000715 (0.00104)	0.00659*** (0.00124)	-0.00286 (0.00427)	0.00282 (0.00466)	0.000121 (0.00208)	-0.000390 (0.00180)	-0.00122 (0.00404)	-0.00188*** (0.000497)
	0.111* (0.0600)	-0.817 (0.535)	0.302 (0.404)	-1.138 (0.885)	0.310 (1.012)	3.345** (1.681)	-0.132 (1.444)	0.564 (1.292)	7.165*** (0.846)
Wald (p-value)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
AR(2) test	0.2970	0.4638	0.4294	0.8704	0.9056	0.6863	0.4265	0.2873	0.2661
Sargan Test	0.7987	0.7357	0.7932	0.7498	0.1497	0.7476	0.1861	0.9362	0.5043
No. of id	8.00	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000

Notes: Standard errors in parentheses,*** p<0.01, ** p<0.05, * p<0.1.

Source: Own elaboration.

impact of human capital on economic progress. As far as the control variables are concerned, the results suggest a statistically significant positive impact of ICT and a negative effect of industry on economic progress. The relationship was also tested for each country separately and the results reveal that human capital is positively associated with economic development. However, the insignificant impact of human capital on economic progress in Bulgaria, Croatia and Albania are consistent with the observed lack of sufficient regulation of institutions in those countries. This in turn leads to suboptimal allocation of human resources, often to non-productive activities.

Empirically, the findings of Ma [2021], and Amassoma and Nwosa [2011] also suggest the insignificant impact of human capital on economic progress in Bulgaria, Croatia and Albania is consistent with the observed lack of sufficient regulation of institutions in those countries. This in turn leads to suboptimal allocation of human resources, often to non-productive activities.

4.4. Robustness check

Applying the Driscoll–Kraay approach following the procedures of Hoechle [2007] is justified by the need to obtain efficient and consistent results even in the presence of cross-sectional dependencies, serial correlation, and heteroscedasticity. Tables 4 and 5 report the estimated results of the D–K and system GMM as a robustness check. The findings confirm the positive impact of human capital on economic progress, which shows that an increase in human capital positively contributes toward economic progress. Further, the separate analysis of each country further validates our previous findings.

The overall study result on the regional level supports the widely known notion that human development plays a crucial role in economic development, validating this notion for the selected Balkan countries. This observations are in line with the general conclusions of two well established recent studies by Ziberi et al. [2022] and Teixeira and Queirós [2016]. At the same time, the detailed country analysis validates this claim for most countries with but a few exceptions.

Conclusions

This research revisited the question of whether human development plays a crucial role in shaping sustainable development, thereby examining the impact of human capital on economic progress. Unlike the majority of previous studies, this study employed panel estimation models to test the human capital and economic progress nexus covering the period 2000 to 2019 of 8 Balkan countries using estimation methods that help to reduce the problem of unobserved heterogeneity and endogeneity. According to our research findings, the human capital structure

in all eight Balkan countries is considerably contributing to the economy's expansion in the region, treated as a whole. Furthermore, this study also examined the effect of human capital on the economic growth in each country. On this level, while generally the notion of the positive impact of human capital on economic growth is confirmed, a few notable exceptions were identified.

The study has significant implications for development planning in countries or regions with similar characteristics as the Balkan region. The findings suggest that investment in education and the market-driven skills are essential for economic development. Yet other factors might have a more impactful role. The non-persistent impact of human capital on economic growth in the separate country analysis is consistent with the notion that institutional specificities and overall governance have a substantial impact on human capital and the growth nexus. For instance, it could be hypothesised that the presence of a weak governance mechanism and underdeveloped institutions may compel the produced human capital to exhibit non-productive behaviour and engage in socially non-productive activities. Secondly, there might be less industry and more service sector impact on the economy in the Balkans. Thirdly, the difference in our findings observed on the country level suggests that the relationship might not be straightforward and further, more detailed, factor-analysis studies are required. Fourthly, the number of control variables used in this study was limited to a few well-recognized ones agreed upon in the existing literature. This set might be too limited while dealing with smaller economies. The relative impact of "big" factors like industrial output might be of less value in countries with poorer industrial bases or where the service sector contributes significantly more to the total GDP.

Nevertheless, the overall results support the positive role of human capital in shaping economic development in the Balkan region. Hence, a substantial increase in government spending on developing education is necessary to sustain the economic growth. Simultaneously, the findings of this research could be helpful for international bodies such as the World Bank and the International Monetary Fund to assist local governments in formulating and executing human development programmes specifically adapted to meet the requirements of various geographical areas. Apparently, the fact is that the non-availability of data after 2019 is a limitation of this study. Future studies may consider the latest available data and replicate the same methodology for individual countries and different regions to provide better insights for policymakers regarding the human capital and economic progress nexus.

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