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HUMAN CAPITAL AND ECONOMIC GROWTH: COMPARATIVE PANEL EVIDENCE OF BALKAN REGION AND EUROPEAN UNION COUNTRIES

PhD dissertation prepared under supervision of

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STRESZCZENIE

KAPITAŁ LUDZKI I WZROST GOSPODARCZY: PANEL PORÓWNAWCZY DOWODY Z REGIONU BAŁKANÓW I KRAJÓW UNII EUROPEJSKIEJ

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Niniejsza praca bada związek między kapitałem ludzkim a rozwojem gospodarczym w Europie, ze szczególnym uwzględnieniem krajów bałkańskich, koncentrując się na 33 krajach europejskich w latach 2000-2019. Badanie ma na celu dostarczenie cennych spostrzeżeń zarówno dla krajów europejskich, jak i krajów rozwijających się, poprzez analizę wpływu czynników kształtujących kapitał ludzki na rozwój gospodarczy. Badanie podkreśla znaczenie analizy regionalnej w Europie, ze szczególnym uwzględnieniem krajów Unii Europejskiej, regionu Bałkanów należących do Unii Europejskiej i regionu Bałkanów spoza Unii Europejskiej. Dzieląc kraje na te regiony, badania skupiają się na regionalnym wymiarze kapitału ludzkiego oraz jego implikacjach dla polityki gospodarczej.

W pracy porównano także wpływ kapitału ludzkiego na rozwój gospodarczy w krajach europejskich o wysokich i średnich dochodach. Kraje o średnich dochodach odnoszą większe korzyści ze zwiększania inwestycji w kapitał ludzki, podczas gdy kraje o wysokich dochodach wykazują większy pozytywny wpływ niektórych elementów kapitału ludzkiego związanych z edukacją, prawdopodobnie ze względu na lepszą jakość edukacji i specjalistyczne umiejętności potrzebne w rozwiniętych gospodarkach. Ponadto badanie analizuje różnice w poziomach rozwoju w Europie, ze szczególnym uwzględnieniem regionu Bałkanów. Wyniki pokazują, że słabiej rozwinięte regiony, takie

jak region Bałkanów, odnoszą większe korzyści ze zwiększania roli kapitału ludzkiego i wymagają inwestycji w edukację, aby osiągnąć długoterminowy wzrost gospodarczy.

Okres czasowy poddany badaniu w niniejszej rozprawie obejmuje lata 1999-2019. Jako metodę zastosowano analizę regresji – zaproponowano kilka modeli pokazujących zależność miedzy wzrostem gospodarczym a zmiennymi opisującymi kapitał ludzki. Wartością dodaną pracy jest przeprowadzona po raz pierwszy w literaturze przedmiotu w analiza porównawcza tej zależności w odniesieniu do krajów bałkańskich w porównaniu do innych krajów europejskich, ale także pomiędzy krajami bałkańskimi w zależności od kryteriów przynależności do Unii Europejskiej oraz poziomu zamożności.

Ogólnie rzecz biorąc, badanie to przyczynia się do zrozumienia znaczenia kapitału ludzkiego w napędzaniu rozwoju gospodarczego w Europie. Wyniki podkreślają potrzebę inwestowania przez decydentów w edukację, zdrowie i edukację, ale pokazują także zróżnicowanie priorytetów tych inwestycji w zależności od stopnia rozwoju danego kraju. Badanie dostarcza cennych informacji decydentom zarówno w Europie, jak iw krajach rozwijających się, oferując wskazówki, jak zaradzić dysproporcjom regionalnym i promować wzrost gospodarczy poprzez tworzenie kapitału ludzkiego.

Słowa kluczowe: kapitał ludzki, wzrost gospodarczy, Unia Europejska, Bałkany

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ABSTRACT

HUMAN CAPITAL AND ECONOMIC GROWTH: COMPARATIVE PANEL EVIDENCE OF BALKAN REGION AND EUROPEAN UNION COUNTRIES

Emirgena Nikolli

This thesis investigates the relationship between human capital and economic development in Europe, focusing on Balkan Region as set against the background of other European countries from 2000 to 2019. The study aims to provide valuable insights for both European and developing countries by analyzing the progress made in addressing educational, economic, and political challenges faced by countries at different stages of socio-economic development in Europe. The research explores the importance and structure of human capital and its integration with economic development, emphasizing the need for long-term growth policies. The study highlights the significance of regional analysis within Europe, specifically focusing on European Union countries, European Union Balkan Region, and Non-European Union Balkan Region. By dividing the countries into these subsets, the research focuses on the regional dimension of economic and human capital and its implications for economic policy.

The research further compares the impact of human capital on economic development in high and middle-income European countries. Middle-income countries benefit more from increasing investments in human capital, while high-income countries demonstrate a greater positive impact of proxies related to education, likely due to better quality education and specialized skills needed in advanced economies. Additionally, the study examines the variations in development levels within Europe, specifically focusing on the Balkan region. The research is based on regression analysis where economic growth is dependent variable and a set of variables representing human capital are explanatory. The findings reveal that less-developed regions, such as the Balkan region, benefit more from

human capital and require investments in education to achieve long-term economic growth. Overall, this study contributes to the understanding of the importance of human capital in driving economic development in Europe since it shows that while components of human capital all contribute to growth it is strongly dependent on the current level of country's development which of the human capital components should be prioritized. The findings emphasize the need for policymakers to invest in education, health, and overall human capital to foster sustained economic growth. The study provides valuable insights for policymakers in both European and developing countries, offering guidance on how to address regional disparities and promote economic growth through human capital formation.

Keywords: Human Capital, Economic Growth, Europe Union, Balkan Region

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INTRODUCTION

The development of human capital is a prerequisite for various types of growth, including social, political, cultural, and economic growth, as noted by Harbison and Myers (1964). The notion that investing in human capital promotes economic growth can be traced back to Adam Smith's time (1776) and the early classical economists who emphasized the significance of investing in human capital. In every country, sustained economic growth accompanied by social development is a crucial macroeconomic goal, and human capital is considered an essential ingredient in achieving this goal. Both the human capital theory and the endogenous growth theory suggest that well equipped human capital has significant economic effects at both the micro and macro levels. According to Dikens et al. (2006), Zoega (2003), and Barro (1991), education inherently holds significant economic worth because investing in it results in the development of human capital. This human capital is a key driver of economic expansion, making it an essential element in theories of growth

However, many practitioners in the field of development economics argue that both human capital and physical capital are crucial to economic expansion. For instance, Solow (1956) presented the neoclassical growth theory and advocated a more significant emphasis on technological progress alongside economic expansion rather than relying on people and material resources. Later, Nelson and Phelps (1966) highlighted the nexus between education and human capital growth, which paved the way for the widespread adoption of cutting-edge technologies in countries like USA or Germany. Romer (1986) focuses on the significance of investing in human capital to spur innovation and economic growth within the framework of his endogenous growth theory.

The notions of Lucas et al. (1988) suggest that a rise in educational attainment can increase human capital, which in turn can increase productivity. Subsequently, Mankiw et al. (1992) added their opinion to the discussion, backing up Solow (1956) model by arguing that physical capital is essential for gauging economic growth. In addition, the scientific community has reached a consensus that the application of technology to improve human capital contributes to a rise in economic output (Barro & Sala-i-Martin, 2004; Gyimah-Brempong & Wilson, 2004; Hanushek & Kimko, 2000; Mankiw et al., 1992; Mkhalid et al., 2010; Qadri & Waheed, 2014; Romer, 1986). Schultz (1961) and

Becker (1972) describe individual characteristics as skills, knowledge, capacities, and understandings gained via experience and training.

Human capital can be measured by factors (proxies) such as education, health, and years of job experience, and it can be used as a basis for raising living standards (Ojo & Ojo, 2022). Qualitative research methods are often used to explore aspects of human capital, even though it is challenging to quantify. Qualitative assessments of factors like schooling and health are among the most reliable measures of human capital (Mohsin et al., 2022).

Empirically, the effects of human capital on growth processes are varied and non-linear since the impact of human capital varies among countries due to differences in their geographic and behavioral contexts (Han & Lee, 2020; Opoku et al., 2022). Other researchers investigate that an efficient workforce increases productivity and considers a significant contributor to human capital development. Hence, few studies reflect human capital development with increasing output (Keji, 2021; Ogundari & Abdulai, 2014; Siddiqui & Rehman, 2017). Krueger and Lindahl (2001) found the connection between education and economic growth and discussed that its effects varied for different regions (Muchie & Ezezew, 2022). Moreover, López-Bazo and Motellón (2012) found a positive association between education and regional income.

Numerous studies have examined the detrimental association between human capital and economic growth. Benhabib and Spiegel (1994) discovered a minimal effect of labor on GDP(Gross Domestic Product). No connection is drawn between education and unemployment as per Ramos et al. (2010) study. Recent research from Spain and southern Europe has revealed that there is no direct link between education and unemployment but that it instead consciously reflects industry conditions and competitive pressures (Muchie & Ezezew, 2022). Moreover, Čadil et al. (2014) in an overview of other works, agree with the principles of European studies and suggest that there is diversity for different regions due to different economic systems that represent income levels and human resources (Mengesha & Singh, 2022). Furthermore, several research studies contradict the idea that human capital negatively correlates with economic expansion. Studies like these also disprove skeptics' ideas that the correlation between human capital and economic expansion is only coincidental or that it is phony because of a dummy variable (Bils & Klenow, 2000). In conclusion, it is necessary to explore this relationship in depth to comprehend it through data testing and practical econometric approaches.

Generally, the wide literature has less focused on health status to growth. Few researchers had only discussed health issue (Pomi et al., 2021). According to their opinion, healthy environment creates more opportunities to create and innovate and to understand technological advancement that leads toward economic growth (Bloom et al., 2019; Ogundari & Abdulai, 2014; Thomas & Frankenberg, 2002). Education, however, has been shown by numerous studies to be a significant factor in determining human capital (Sultana et al., 2022). To examine the impact of education on economic growth across countries, Benos and Zotou (2014) performed a meta-analysis of 57 macro-level research. From recent studies, Polemis & Oikonomou, (2022). are now focusing on better health and education that may boost the economy.

The inclusion of health makes the definition of human capital more all-encompassing (Aka & Dumont, 2008; Bloom et al., 2004; Glewwe et al., 2014). Filmer and Pritchett (1999) propose that better education and health provide more precise measures of human capital and invalidate the omitted variable argument of earlier studies. Thus, Yang et al. (2019) investigated East Asian nations to examine how education affects workforce productivity; however, they found that the association between education and output was less when health was also considered (Bareke et al., 2021).

In addition, there is a dearth of evidence connecting human capital and economic growth particularly the importance of health and education specifically for the European context (Gyimah-Brempong & Wilson, 2004; Ogundari & Awokuse, 2018). As a result, it will be necessary to give this association even more attention to comprehend potential disruptions (Matousek & Tzeremes, 2021).

Keeping in view the above discussion, the current research examines the effect of human capital on economic growth in whole sample and subsamples to better understand the relation between human capital and economic growth in the specific setup of Balkan Region. There are multiple approaches to which the present study adds to the body of knowledge. *Firstly*, this study's findings aim to quantify human development's impact on economic growth by qualitatively and statistically describing how health and education perform as human capital indicators (following the ideas of Zhang et al., 2021). It is expected that developing and developed countries would feel the impact of these factors differently. The primary objective was to compare the effects of several human capital

indicators, including levels of education and health, on economic growth across a range of economies.

Secondly, his study's contribution lies in its focus on the Europe as the sample region. The study analyzed 33 European countries from 2000 to 2019 to investigate the link between human capital and economic development. The choice of the European Region as a sample was motivated by two reasons. Firstly, the historical trajectory of human capital in Europe might offer insightful learnings for both European nations and those in the developing world. Secondly, numerous developing nations are currently confronting educational, economic, and political choices reminiscent of those European countries grappled with during their nascent stages of economic progression. Therefore, by studying the impact of human capital on long-term economic success in Europe, we might uncover potential hurdles and strategies for nurturing human capital in emerging economies.

Thirdly, this study examines different subregions within the European Region for several reasons. Human capital is a critical factor in economic development and a potential driver of future growth, but its historical role and formation remain insufficiently understood. This poses a significant challenge for policymakers tasked with implementing effective growth policies that consider underlying long-term evolutions (Hanushek and Woessmann 2015). The imperative to address human capital becomes even more critical at a regional scale since it holds significant weight in explaining the variations in regional development levels. The importance of the regional perspective in the discourse of economic growth cannot be stressed enough, as underscored by Nobel Prize winner Paul Krugman (Krugman, 1991). In this context, regional policies hold a significant position in the overarching strategy of the European Union (EU).

Building on this, the present research delves deeper by concentrating on individual countries within these regions rather than considering regions as homogeneous entities. The rationale behind this approach is that regions can encompass diverse countries, each with unique linguistic, ethnic, and cultural nuances. This heterogeneity can lead to stark regional developmental disparities, which might be glossed over when looking at regional averages. In essence, relying solely on country aggregates could obfuscate the genuine dynamics and influences at play at more nuanced levels.

Based on the aforementioned discussion, this study looks into 33 selected countries of the Non-European Union Balkan states, European Union, and European Union Balkan states. Of the 33 countries, 6 economies are part of the Non-European Union Balkan group, 24 are members of the European Union, and 10 belong to the European Union and Balkan Region. Given the broad scope of this topic, this research concentrates on the regional (considered as formal subdivision by geography – i.e., being Balkan but also political and socio-economic dimension – i.e. belonging to the EU or not) aspect of human capital and economic development in Europe, drawing insights for policymakers and offering a deeper understanding of the issues at hand. The European Union political and economic rules are assumed to be a considerable differentiating force in this research.

Fourthly, to account for differences in development levels, this study utilized the International Monetary Fund's income-based classification system to divide the data into two groups. Of the 33 countries included, 26 were classified as high-income - based on the IMF criteria, while the remaining seven were classified as middle-income. There are multiple reasons for using this classification system. Firstly, existing research indicates that human capital, particularly health-related proxies, plays a crucial role in driving economic growth in both developed and developing countries. In countries, where demographic dividends are being experienced, a longer skilled labor force lifespan is contributing to growth. Therefore, investing in health quality in developing countries is essential to facilitate the impact of education quality on growth. Secondly, government health expenditure positively affects economic growth, while life expectancy has a negative relationship with economic growth in developed countries due to the increased dependency ratio. In summary, this study suggests that the quality of human capital, including education and health, has a more significant impact on growth in developing countries than in developed countries.

Objectives of the dissertation

This study examines the role of human capital in shaping economic development in Europe. Further, this study also considers the human capital and economic development nexus in subsamples such as non-European Union Balkan Region, European Union Countries and European Union Balkan Region. Further the study also ascertains the role of human capital in economic development of advanced and developing economies. Against this background, this study has the following objectives:

1. To examine the impact of human capital on economic growth in Balkan countries
2. To identify the predominant determinants within the human capital variable of economic development
3. To examine the behavior of predominant determinants to answer whether a visible difference exists between Balkan EU and Balkan Non-European countries.

Hypotheses of the Dissertation

Keeping in view the extant literature, this study formulates for following hypotheses for testing.

H1: Human capital is positively associated with economic growth in the Balkan Region

H2: Government expenditure on education is positively associated with economic growth in the Balkan Region

H3: Life expectancy is positively associated with economic growth in the Balkan Region

H4: Level of education is positively associated with economic growth in the Balkan Region

H5: The impact of human capital on economic growth is stronger in Non- EU Balkan Region than EU- Balkan Region

H6: The impact of government expenditure on education is stronger in Non- EU Balkan Region than EU- Balkan Region

H7: The impact of life expectancy on economic growth is stronger in Non- EU Balkan Region than EU- Balkan Region

H8: Quality of education (no of students enrolled in primary, secondary and territory) is positively associated with economic growth in a stronger way in Non- EU Balkan Region than EU- Balkan Region

Methodology

The research scrutinizes the persistent causal effect of human capital on economic development. In addition, financial development, industry, international tourism, ICT and trade are considered as control variables. The study uses six proxies to measure human capital such as: human capital index, government expenditure on education, life expectancy, schooling at primary, secondary and tertiary levels. Whereas, the economic

growth is measured through gross domestic product (Ogundari & Awokuse, 2018). The data of 33 European countries is collected over the period of 2000-2019.

The data analysis in this study was carried out in five stages. The first step involved computing descriptive statistics and correlation matrices to detect any issues with outliers and multicollinearity. The second step followed the approach of Le et al. (2019a) and Peseran (2004) to test for cross-sectional dependence, as well as Wooldridge and Modified Wald tests to identify serial correlation and group-wise heteroscedasticity, respectively. In the third stage, the study examined the relationship between human capital and economic growth in the overall sample and sub-samples, such as European Union countries, Europe Union Balkan Region, Non-Europe Union Balkan Region, Developed (high-income) European Union countries, and developing (middle-income) European Union countries. To obtain comprehensive, complete, and consistent regression coefficients in the presence of heteroscedasticity, cross-sectional, and temporal dependence, advanced panel estimators such as the Driscoll and Kraay with robust standard error following the procedure proposed by Hoechle (2007) were utilized. In the fourth step, the FGLS model and System GMM were employed to verify and validate the empirical findings on the human capital and economic growth nexus using the approach proposed by Le et al. (2019b). These techniques are known to produce consistent and unbiased coefficients, even in the presence of auto-correlation within-group and panel-wise heteroscedasticity.

Structure of the Dissertation

The dissertation is structured into 5 chapters, Chapter 1: Theories of Economic Development. In this chapter, the thesis introduces and discusses various theories of economic development. It provides an overview of the key concepts, debates, and empirical evidence surrounding these theories. Chapter 2: Human Capital and Economic Development. This chapter explores the relationship between human capital and economic development. It also establishes the significance of education, skills, and health in fostering economic growth. The thesis analyzed existing literature, theoretical frameworks, and empirical studies on the subject to define how the concept has been tackled by science community but also to identify research gap. Chapter 3: Balkan Countries, focuses on the specific context of Balkan countries. It provides a background on the economic characteristics, challenges, and opportunities in this region and provides

comparison of the Balkan region and the European Union. Chapter 4: Model and Data Analysis, in this chapter, the thesis outlines the research methodology, including the model used to analyze the relationship between human capital and economic development in whole sample. The study considered further extended the data analysis for in-depth understanding of the role human capital has in shaping economic development, thereby dividing the whole dataset into two groups, like 26 countries as high-income countries, whereas the remaining 7 countries are considered middle-income countries. Similarly, the study segregated the whole sample into subsamples based on different region in such a way that 6 countries belong to Non-Europe Union Balkan Region, 24 countries are included in European Union Countries, and 10 countries belong to both Europe and Balkan Region. Chapter 5: Results. This chapter presents and interprets the findings of the data analysis conducted in Chapter 4. It discusses the empirical results, statistical significance, and any patterns or trends observed in the data. The chapter also includes relevant tables, charts, or graphs to illustrate the results. Finally, the Conclusion, the final chapter summarizes the main findings of the study and draw conclusions based on the research questions and objectives. It discusses the implications of the findings for theory, policy, and practice in the context of economic development in Balkan countries. The chapter also provides recommendations for policymakers, practitioners, and future research directions in the field.

CHAPTER 1
THEORIES OF ECONOMIC DEVELOPMENT

1.1 The Economic Concept of Growth

Numerous economists have put out diverse ideas about the phenomenon of economic growth. Adam Smith, a renowned Scottish philosopher and economist, is widely acknowledged as the progenitor of classical economic theory, which he initially postulated in the year 1776. The theory of the economic school of thought was highly regarded as an influential step worldwide. Adam Smith's renowned work, "The Wealth of Nations," is widely regarded as a seminal contribution to economics. It presents a compelling argument in favor of free market economies, highlighting the advantages they offer, such as laissez-faire principles and unrestricted competition. The book also presented crucial notions, such as the phenomena of self-interest, which substantially impacted the augmentation of national wealth.

The previously described conventional theory expanded the range of economic literature, and following works by additional economists introduced fresh viewpoints. The value of labor hypothesis was established by David Ricardo. In a free market economy, it is imperative for the cost of labor to remain proportional to the selling price of the product. The distinguished intellectual, Mill, (1848) further elaborated on this notion within the framework of contemporary society. The notion proposed that although the rule of production remains immutable, social institutions can exert influence over the law of distribution. Hence, it is necessary to permit employees to establish cooperatives and autonomously control the production process.

In addition, Malthus, (1872) formulated the classical growth theory, predicated upon the idea that expanding a population inherently engenders inescapable economic ramifications. The Malthusian perspective posits that the exponential expansion of the population necessitates the implementation of adequate measures to address the challenges arising from this phenomenon. However, the rate of output does not exhibit exponential growth. The allocation of limited resources based on population size is essential for preserving economic stability. Based on his theoretical analysis, the confluence of the Industrial Revolution and advancements in agriculture is necessary for

augmenting a nation's rate of output. In order to mitigate the risk of economic overheating and provide adequate food security, it is imperative to implement measures aimed at constraining population growth.

Classical economics focuses on the relationship between the law of diminishing returns and population growth (Jackson & McIver 2001). The law of diminishing returns contends that “as successive equal increments of one resource (e.g., labor) are added to a fixed resource (e.g., land), beyond some point the resulting increases in total output (marginal outputs) will diminish in size” (Jackson & McIver 2001).

Understanding the consequences of optimal population theory necessitated a broader examination of the subject. Economists have long emphasized the value of maintaining the world's natural resources. It is critical to control national income per individual while serving the entire population's needs. Another economists proposed that the benefits of economic output should be shared by all the individuals and organizations who contributed to it (Library of Economics and Liberty 2002). The concept that the perception of worth by the consumer determines its equivalence to 'value' emerged due to the discrepancy between market prices and the actual cost of production for goods. This factor influenced the emergence of the concept of supply and demand. The advent of the "marginal revolution" within economics facilitated the groundwork for advancing neoclassical economics. The principles of neoclassical economics posit that humans possess the capacity to independently make decisions, considering comprehensive and precise information. Furthermore, they prefer outcomes that yield the most significant advantages to themselves while simultaneously endeavoring to optimize utility and profit. Schumpeter, (1939) introduced an additional pioneering hypothesis on economic growth. According to Schumpeter, the driving force behind economic growth lies in technical innovation and entrepreneurship, which he deemed to be of greater significance than factor accumulation. One fundamental element of the Schumpeterian theory of economic progress is the concept of "creative destruction." This concept received praise for its promotion of entrepreneurial spirit. Innovative products, services, or organizational designs are put forth by visionary entrepreneurs to drive economic growth. Business owners want a unique production technique to attain market domination. Replacing outdated methods with modern ones is known as "creative destruction." It is necessary for long-term development and prosperity. A prominent economist, Joseph Schumpeter, espoused the concept of economic growth cycles. Schumpeter's impact on contemporary

growth theories, such as endogenous technological development, is evident in the assertion that technology is generated by profit-driven enterprises. The Schumpeterian growth models proposed by Schumpeter, encompassing concepts such as innovation, competition, and creative destruction, have been widely acknowledged and accepted within academic discourse. According to the Schumpeterian perspective, the dynamism of entrepreneurs plays a crucial role in stimulating economic growth despite the unintended outcome of rendering certain enterprises or technology outdated.

The Harrod-Domar model originated in the 1930s and was developed as a theoretical framework to elucidate the factors contributing to economic growth. This model incorporates vital variables, including savings rates and capital productivity, in its analysis. The nomenclature of the model was derived from the two economists who originally formulated it. The theory posits that long-term equilibrium economic development is not inherent or achievable within an economy, as independently formulated by R. F. Harrod in 1939 and E. Domar in 1946. Both R. F. Harrod and E. Domar made significant contributions to the advancement of the idea. Based on the model presented, it is posited that any deviation from the equilibrium levels of the savings rate, capital-output ratio, or labor-force growth rate will result in adverse consequences for the economy, manifesting as either an increase in unemployment or the persistence of inflation. The Harrod-Domar model aims to establish equilibrium in economic growth by comparing the intrinsic rate of development, determined solely by labor growth in the absence of technological advancements, with growth influenced by savings and investment patterns of households and businesses. The natural rate of economic growth is contingent upon the expansion of the labor force as its single determinant. Enhancing the savings rate would increase loan accessibility, hence fostering capital expenditures and expediting technological advancements. According to the Harrod-Domar model of production, the concept of 'fixed proportions' entails that labor and capital cannot be interchanged during the entirety of the production process.

The Harrod-Domar model was the foundation for the exogenous growth model's development. The exogenous growth model owes much to the work of Robert Solow, a pioneer in the field. Solow produced an improved model in 1956 that includes all of the basic assumptions of the Harrod-Domar except the concept of "fixed proportions." This made it easier to distinguish between the effects of more money and those of better technology. The proposed model adds a new productivity-based variable to the Harrod-

Domar model. Solow enriched the Harrod-Domar model by including labor as a productive input. The realization that there are declining returns on both labor and money on their own, but constant returns on scale when the two are combined, enabled the breakthrough. An exogenous technology variable was added to the endogenous variables of capital and labor. The model accurately mirrored available data on the growth of the American economy throughout the selected time period. In 1987, Solow was given the Nobel Prize in economics for his work on the model.

Trevor Swan's concept was introduced with the publication of Solow's work in 1956. This model depicts how an increase in capital can lead to an increase in productive labor. According to the current model, economic growth is determined by two factors: capital accumulation and labor availability, both of which are influenced by an elastic production function. Exogenous growth is a component of the Solow-Swan model, which gets its name from the fact that it combines ideas from both economists. Based on neoclassical economic principles, the aforementioned theories provide a comprehensive explanation of a country's economic progress over time. This viewpoint holds that expanding the quantity of available commodities is the only way to secure long-term economic growth. The exogenous growth theory was created because it became evident that technological improvement is a critical component in increasing product availability. The models employed here are based on the concept of an aggregate production function, which posits that output is determined by capital, labor, and technology inputs.

According to exogenous growth theories, long-term economic growth is determined by external factors such as technological level. In this viewpoint, consistent economic growth, sometimes known as a "steady-state," is thought to be the economy's long-term goal. Net capital accumulation ceases when this stage, as measured by output per worker, is attained. This stable condition is only possible if technological advancement and population growth continue at their current rates. If output per worker remains constant, the model predicts that increasing labor will increase output in the setting of steady-state economic growth. However, if we consider how to implement technological improvements within a stable economic system, doing so would result in a proportionate gain in worker productivity, which would lead to an increase in capital's marginal product. The key premise of the neoclassical growth model of declining returns to capital is represented in exogenous growth models. This model has been challenged for claiming that economic growth is exogenously dependent on technical progress (Rogers, 2003).

The Solow-Swan model has exerted significant effect on numerous other theories, owing to its fundamental concept of economic growth. Nonetheless, it's critical to comprehend the sources of technological advancement. In 1986, an economist Paul Romer developed the idea of an endogenous growth model. In this model, long-term economic growth based on technical progress is viewed as an endogenous component. Dependence on other model variables is required for technological advancement. Furthermore, it is well acknowledged that knowledge is a factor in manufacturing that can increase marginal productivity. This model differs from the neoclassical exogenous growth model in that it permits increased economic growth rates over time. According to the exogenous growth model, predicated on decreasing returns, growth will eventually level off. Manufacturing can be considered an input to achieve optimal outcomes, while research and development can be viewed as processes. To enhance operational effectiveness and get a competitive advantage, businesses must acquire skills, knowledge, and expertise. Romer emphasized the significance of innovative ideas and strategic financial decisions in developing advanced technology equipment to achieve enhanced profits. Romer also addressed the concept of spillover effects, wherein the success of one firm confers benefits upon other organizations within the broader economy. Based on this spillover effect, public policy can support research and development. The prevalence of the endogenous growth model can be observed when certain conditions and procedures are in place to foster innovation and the accumulation of knowledge. Nevertheless, government intervention is vital for the attainment of economic advancement. This concept had significant implications for understanding the relationship between innovation, technology, and human capital in the context of economic progress. Lucas Jr, (1988) argues that there are significant variations between physical and human capital. It is human work and expertise that generates new products, which leads to economic progress. Robert Lucas strongly emphasized the value of human capital and supported organic growth. According to his perspective, measuring human capital is most effectively accomplished by considering an individual's educational attainment, training, and professional background. Nevertheless, this theory posits that implementing policies prioritizing investments in individuals' capacity to acquire knowledge and develop their skills as employees might result in long-term economic growth. The hypothesis presented in this study introduces a fresh perspective by highlighting the significance of human capital accumulation as the primary driver of sustained economic development, as opposed to the conventional focus on innovation and

technological advancements. Hence, this concept holds significant implications for subsequent economic research and the formulation of policies. The significance of allocating resources towards education and training was underscored as imperative for the sustained well-being of the economy. Along with standard economic growth assumptions, scholarly research has been performed to examine the role of institutions. North, (1993) defines institutions as "social rules or limitations that regulate human interaction." Rodrik, (2000) elaborated on this concept by defining five types of institutions: those concerned with property rights, regulation, sustaining macroeconomic stability, social insurance, and conflict resolution. Rodrik's numerous important conclusions include the fact that no single optimum institutional framework can be applied to all countries. An emphasis on the importance of political and economic institutions in their institutional approach to economic development was discussed by research team called AJR (Simon Johnson; James A Robinson; Acemoglu, (2001) and demonstrated that sustainable economic growth is influenced by institutions. According to AJR, institutions, the social norms that govern behavior, ultimately determine national wealth. Institutions that allow and encourage the masses to participate in economic activities that make the best use of their abilities and skills and those that limit individual agency were explored. Business expansion is facilitated by groups like this because they foster risk-taking and new investment. In contrast, extractive organizations are set up to systematically loot a particular population to benefit a larger group. Limiting economic growth, extractive institutions distort the incentives and opportunities for most people. A "reversal of fortune" on a global scale was reported by AJR. Some areas of Africa and India became impoverished due to extractive colonial institutions, whereas other regions of North America became more prosperous due to more inclusive institutions. Economic success is in AJR's research, critically dependent on the inclusive institutions. Instead of rushing to implement new economic policies or provide aid, we should work on changing the underlying institutional structures that determine financial incentives and outcomes. AJR theories of institutions show that a nation's economy's success is tied to its institutions' quality. They conclude that successful economies require institutions that welcome all members of society.

The role of another related factor - innovativeness in modern economic development models, was analyzed by a study conducted by Xiong et al. (2020) in China to examine the relationship between R&D (Research and Development), and economic growth. Panel

data study was conducted to evaluate the impact of social norms and R&D. The study framework consists of two directional analysis such as R& D investment and R&D output and the other estimation with R&D output and economic output. The results concluded that R&D input, R&D output and economic growth have variation in different regions. The social circumstances also affect this analysis. These outcomes disclose the intricacy of associations between R&D efforts and economic performance and point to social filters' (like existence of institutions) significant role in innovation and development. The research conducted by Acemoglu et al. (2005) also emphasized the significance of institutions in fostering economic growth. This study examined the process of European conquest in many regions across the globe, commencing in the 15th century. Additionally, it explored the division of Korea into two independent entities. Based on those varied backgrounds it concludes that economic institutions are pivotal in delineating the parameters within which diverse financial elements operate, influencing economic outcomes. Consequently, economic institutions assume responsibility for shaping social determinations. Due to the presence of various groups and individuals, it is common for preferences about socioeconomic issues to exhibit significant divergence. Political arrangements and resource distribution typically favor the party with greater strength in a struggle for limited resources. This investigation utilizes both de jure political power, legitimized by popular support but lacks constitutional backing, and de facto political power, legitimized by an established constitution, as conceptual foundations. According to Acemoglu et al. (2022), the evolution of political institutions and resource allocation is influenced by the impact of preexisting economic institutions on resource distribution. Moreover, parties with de facto political power exhibit a desire to enhance their de jure political power by instigating modifications in political institutions. The study's findings suggest that economic institutions are accompanied by political institutions that distribute power among various interest groups, encompassing the protection of property rights, the imposition of adequate checks on those in power, and a scenario where only a small portion of economic rents can be captured by power-holders, are more inclined to facilitate economic growth.

The theory of structural growth provides valuable insights into comprehending the contributions of many economic sectors in evolution of growth. The development concept established by W. Arthur Lewis, (1988) involved strategically reallocating surplus labor from the agricultural industry to the industrial sector.

Numerous economists explain the underlying reasons and mechanisms via which civilizations undergo transformations in their manufacturing and revenue creation methods. The economy comprises three main sectors: agriculture, industry, and services. Investment and labor in these domains are crucial. Economies, in the process of growth, undergo many stages. Rural populations migrate to urban areas due to the transition from agricultural technology to industrial technology. The impact of technology results in the demise of specific organizations while simultaneously giving rise to new ones. Contemporary structural transformations exert an influence on the dynamics of international trade. Providing education and training to workers can facilitate their transition to higher-level enterprises. The study demonstrated the impact of governmental intervention on initiatives aimed at inducing structural changes. Accordingly, the development of infrastructure and the provision of education contributes significantly to the process of industrialization and the generation of employment opportunities within the service sector. However, the authors discuss the challenges of premature deindustrialization, where an economy shifts from agriculture to services without a significant industrial phase, missing out on growth opportunities and the lack of skilled workers to transition between sectors.

Another well-established economist, Paul Prebisch (1972) believed that the global economic structure possessed fundamental inequities. Dependence theory classified nations into "core" and "periphery" categories. The core countries exhibit a higher degree of development. The authors suggest that prevailing global economic arrangements are biased towards core countries. The periphery is responsible for producing raw materials and agricultural goods, whereas the core is characterized by the concentration of high-value manufacturing and service industries. Trading on the peripheral is generally deemed unfavorable due to the presence of this difference. Experts widely acknowledge that increasing dependence on the financial resources of a nation or a global organization can provide advantageous outcomes. When peripheral countries offer low-cost labor and raw resources rather than pursuing development, such investments reinforce economic connections. Dependency theory posits that the narrative of action can be refuted by asserting that international financial arrangements favor empowering robust governments at the expense of weaker ones.

Nelson, (1959) and Winter Jr, (1964) are widely recognized as key figures in the development of evolutionary economics. Adopting an evolutionary perspective in the

study of development provides a heightened level of intricacy and dynamism in comprehending the process of economic progress. The primary focus of this study is on the concepts of change, adaptation, and the dynamic interplay between individuals and organizations across time. In economic systems, profits should exhibit a growth tendency over a while. The value of a technique or method may increase as its utilization becomes more widespread, resulting in rapid dissemination and advancement.

The transition of economic development theory from the initial labor, capital and soil as prerequisites of economic growth towards more technology and social oriented factors is visible both by following key literature and economic policy. It could be summed up, that against this theoretical backdrop, keeping in view the importance of sustainable economic development, the current empirical economic literature remains focused on achieving sustainable development through a bunch of "new" factors which should be considered among the typically applicable traditional factors of economic growth. Among those "new" factors the recent literature primarily focuses on: information communication and technology (ICT), institutional quality, trade openness, increased foreign finance and financial development (Ahmed, Kousar, Pervaiz, & Shabbir, 2022; Alshubiri & Elheddad, 2020; Appiah-Otoo & Song, 2021; Hunjra et al., 2022). The importance of those factors has become the highlight of economic discussions over the last three decades.

Regarding the financial factor, the literature for instance points out that fostering financial development facilitates the optimal allocation of capital resources, enhancing their production to the fullest extent possible (Chang & Caudill, 2005). The economic system supported by adequate financial sector plays a crucial role in mitigating the risks associated with entrepreneurship and innovation (Levine, 1997). Moreover, the financial system facilitates the expeditious exchange of commodities and services, enhancing economic operations. Financial institutions play a crucial role in facilitating significant investments and aiding investors in making well-informed decisions. The promotion of financial growth additionally enables improved corporate governance, an essential factor in guaranteeing the effective and efficient utilization of existing resources inside firms (Durusu-Ciftci et al., 2017).

One approach to boosting the economy is to enhance the size of the industrial sector, which can lead to several positive outcomes, such as increased output, job opportunities, technological advancements, and monetary influx. The significance of industry

development in any economy lies in its capacity to generate tax revenue, enabling governments to allocate greater resources towards essential services and infrastructure (Watkins, 1963). Furthermore, the implementation of technical innovation and progress in manufacturing enhances efficiency and productivity and contributes to the diversification of the manufacturing base, thereby reducing the economy's dependence on a limited number of industries. Consequently, individuals have enhanced prospects of acquiring proficient technological abilities, achieving substantial financial returns, and enjoying favorable living standards (Feshina et al., 2019).

Trade openness refers to the extent to which a nation promotes and enables international trade while refraining from imposing unwarranted restrictions on its trading counterparts. The entity leverages global marketplaces to attain its economic significance, augmenting its sales and profits. When nations prioritize the production of commodities and services with a comparative advantage, they can optimize the utilization of limited resources. Staying abreast of global market conditions may contribute to the enhancement of innovation and productivity. The proliferation of competitive markets has resulted in an expanded array of cost-effective alternatives for customers. Foreign investment is crucial in facilitating trade openness and fostering economic growth and development (Alam & Murad, 2020).

Tourism refers to traveling and residing in a distinct geographical area for leisure, business, or other relevant objectives. Tourism encompasses diverse activities, spanning from sightseeing to immersing oneself in the local culture, and often plays a significant role in fostering economic development within the hospitality industry (Castro et al., 2018). The influx of visitors contributes to a nation's economic well-being by introducing foreign capital into the local economy. In this particular context, economies allocate resources towards the development of infrastructure to enhance their capacity to cater to the needs of visitors and tourists. Tourism plays a significant role in fostering economic growth in less industrialized regions with natural or cultural attractions (Ivanov & Webster, 2007).

Information and Communication Technology (ICT) is crucial in enhancing productivity by facilitating access to modern forms of innovation and strengthening global communication channels. The advent of digital infrastructures has significantly reduced the planet's perceived size, effectively creating a virtual cocoon. Modifying information

and establishing connections between businesses and international markets can be straightforward. Revolutionary corporate methods and imaginative new concepts related to ICTs have facilitated higher national returns on investment. This communication technology inclusion has been found to yield significant advantages specifically for underdeveloped regions (Bassanini et al., 2000).

In view of the modern development theories, a certain set of abovementioned factors which might contribute to the economic growth besides human capital – which is the cornerstone of this thesis research – have to be considered as control variables. As modern economic development theories pin-point some of the more common factors, these need to be considered a possible interference in the study of human capital – economic growth relation and given more attention. Among those factors the literature review points especially at: financial development, industrial expansion, trade openness, tourism and modern technology intensity of the economy.

1.2 Selected Factors of Economic Growth

1.2.1. Financial Development and Economic Growth

The linkage between finance and growth has been intensively the subject of research on economic development. The publication on this theme is well summarized by King and Levine (1993) and subsequent research and discussions have expanded upon their findings. These studies have mixed results, nevertheless. These inconsistent findings can be attributed to several factors, including geographical variation, different periods for analysis, and varying research methodologies. Specifically, for the less developed countries case, some insightful works should be brought up. Tran et al. (2020) collects a firm-level dataset consisting of more than 40,000 Vietnamese firms to investigate the influence that local financial development has on the expansion of businesses, which is reliant on corruption. Their results support the idea that progress in the financial sector contributes to overall economic expansion. Using the generalized method of moments (GMM) technique and several proxies for financial development, Nguyen et al. (2019) analyzed the economic condition of middle-income countries and empirically argued that role of bond market and stock market is crucial. Moreover, their results showed positive impact of bond market and stock market in the high-income nations. Similar findings were reported by Ang and Inkpen (2008) who looked at Malaysia's finance and growth

nexus from 1960 to 2003. Additionally, Yang et al. (2019) researched that equity market development has reverse causality effect on economic growth in developed nations. However, as per their application of Granger causality effect on the nexus of inflation and banking system they conclude that financial development is most significant precondition of economic growth in developing (lower income) economies.

However, other academics have investigated this connection and concluded the reverse effect is in place - that financial growth depends primarily on economic expansion. Lucas Jr (1988) argued in his book “The Magic of Growing Economies," that the significance of the financial sector to the expansion of the economy is more of a conceptual truth than an actual one. Modigliani and Miller (1958) on the other hand argue that progress in real sectors is unimportant to financial sector development under information symmetry and zero transaction costs. Even more surprisingly, Morck and Nakamura (1999) claim that the banking sector stunts economic expansion.

Recently, the endogenous financial development and growth models have been widely examined. Financial services and goods, as well as easily accessible financial markets, are assumed to play a pivotal role in expanding a country's economy in those models. The relationship between financial advancement and economic expansion is studied by numerous experts using this paradigm. For instance, Shahbaz et al. (2013) examined the interrelationships between the expansion of GDP, energy consumption, financial advancement, and commercial openness using multivariate framework analysis. Following their results, one might argue that using autoregressive distributed lag (ARDL) bounds testing, one may demonstrate the existence of long-term linkages between these components and a two-way causality between economic progress and financial progression. In another econometric based study, the Toda and Yamamoto test was used (Wolde-Rufael, 2009) to look for bidirectional Granger causation between economic expansion and the banking industry showing a link between the two. Using data from 35 countries spanning 1961-2015, Pradhan et al. (2018) repeated this empirical testing.

Moreover, various studies have examined the oblique effect of financial advancement on economic expansion concentrating on foreign direct investment (FDI) as an essential contributor to economic growth. Alfaro et al. (2004) examined the role of FDI in driving this growth. Kutan et al. (2017) also examined the significance of FDI and institutional quality in the Middle East and North African (MENA) nations. Thus, there is a positive

correlation between financial advancement and economic expansion wherever FDIs are in place. The impact of capital flows on economic growth as a function of institutional quality of the financial system is another topic explored by Slesman et al. (2015). They concentrated on institution quality since it is the crucial factor that can help middle-income nations accelerate their economic growth.

To sum it up – the majority of studies support the notion that financial sector development is linked (often two-directionally) with economic expansion.

1.2.2. Industry and Economic Growth

Industrial output is a crucial indicator of national economic health. The industry sector provides various advantages to a country's economy, such as lower unemployment rates, higher rates of output and innovation, and better utilization of available resources. This notion is a cornerstone of the classical economic theory where heavy industrial expansion results in strong GDP growth and has been accepted in the economic theory for the majority of XXth century. However, as industrialization progresses, the energy demand might be leading to environmental catastrophe and other unfavorable conditions, which in turn will hamper economic growth. Further, FDI flows and modern technology from developed to developing nations are bolstered by trade. Recently the idea that promoting the growth of environmentally friendly industries offers better trade-off between industrial and economic growths is gaining momentum (Anwar & Elfaki, 2021). The relation between the two as considered under classical industry growth model is no longer applicable due to the fact that rising industrial production brings back the problem of dwindling resources, which has a chilling effect on people's standard of living (Abbas et al., 2020).

Again, in the context of less developed regions, Opoku and Yan (2019) using a GMM approach, experimentally investigated the effects of industrialization on economic growth in 37 African countries during the period of 1980-2014, and they found encouraging (positive relation) results. The impact of industrialization on GDP growth in Senegal was analyzed by Ndiaya and Lv (2018) using ordinary least squares (OLS) from 1960-2017 again proving positive relation. Wonyra (2018) discovered a similar favorable association in Sub-Saharan Africa. However, negative results were discovered by Saba and Ngepah (2022) for 171 nations between the years 2000 and 2018. Finally, among those somewhat contradictory results, the large sample study of Szirmai and Verspagen (2015), who

researched the role of manufacturing in the economic development of both developed and developing countries from 1950 to 2005, should be recognized. Their data shows that industrial manufacturing contributes significantly to economic expansion regardless whether economy is in early or advanced stages of development.

1.2.3. International Tourism and Economic Growth

Tourism is having a significant influence on the economics and societies of both developing and developed nations last two-three decades, making it one of the businesses with the most rapid growth. The consistent upward trend in the number of international visitors over the past several decades is undeniable evidence that the global tourism industry is flourishing and robust (Ivanov & Webster, 2007).

The United Nations World Tourism Organization (UNWTO) predicts that by the year 2030, there would be 1.8 billion international tourists. Increasing tourist arrivals can boost the economy in several ways. Better job prospects and more robust tax revenue are both helpful in expanding economic resources (Ferguson, 2007). When a country is economically stable, it can afford to invest more in things like infrastructure, human resources, and cutting-edge technology, all of which have the potential to boost productivity and spur new forms of competition. In addition, tourism fuels an abundance of new community gatherings of all stripes. Working with a wide variety of people can help anyone gain the self-assurance and shared experience they need to make an impact on a global stage. The increased foreign-exchange profits are a financial boon. As efforts are made to green the tourism industry, it may soon play a pivotal role in advancing environmental sustainability and economic development (Tang & Abosedra, 2016).

As tourism grows, it has incredible effects on the economy, resulting in the formation of the tourism-led growth(TLG) which prompted the formulation of TLG hypothesis (Balaguer & Cantavella-Jorda, 2002). This hypothesis proposes that tourism significantly contributes to the country's thriving economy. Based on the TLG hypothesis, governments should plan to distribute funds effectively for tourism-related activities so that citizens can benefit from the industry's projected expansion.

The tourism industry has seen tremendous growth in many regions over the past four decades, contributing significantly to the local economy. It has attracted much interest from academics investigating the connection between tourism and economic growth.

Ghali (1976) was the early researcher to link the expansion of the tourism industry to economic growth and to do an empirical study of this relationship using the ordinary least square method. Using the support of TLG hypothesis, many recent researchers investigated tourism and growth nexus with different selection of variables, sampling size, regions, methodologies, and frequency of observations (Gunduz & Hatemi-J, 2005; Nowak & Sahli, 2007; Sanchez Carrera et al., 2008; Tang & Abosedra, 2016; C. F. Tang & B. W. Tan, 2015). Several of those scholars formulated the growth-led hypothesis after examining the relationship between tourism and economic growth. According to the growth-led theory, tourists are attracted to nations that priorities their economies' capacity for expansion. The thriving economy of the countries is a significant extra draw for international tourists. Therefore, governments must allocate resources to enhance their economic climate and tourism infrastructure.

The positive feedback mechanism between economic expansion and tourism development is further supported by evidence presented in a number of more recent publications. (Chen & Chiou-Wei, 2009; Dritsakis, 2004; Moon et al., 2006; Shahbaz et al., 2013; Shahzad et al., 2017). Finally, it has to be mentioned that despite the overwhelming majority of studies, some researchers concluded that no correlation between the tourism industry and economic growth exist. Those effects were usually dependent on specific geographical locations and might be associated with other (e.g. political) factors. Those country varying results have been reported by Biggs & Tang (2011); Katircioglu (2009); Ozturk & Acaravci (2009); Sanchez Carrera et al., (2008).

In addition, since the tourism has grown significantly over past decades, its more significant negative growth impacts have been registered. When more people move in due to the tourism, they increase demands on infrastructure like power plants and water infrastructure, devastatingly impacting their surroundings (Capo et al., 2007; Schubert, 2010). Overtourism also gives adverse effects on local community lifestyle (Chao et al., 2006), spread of infectious diseases (Capo et al., 2007; Holzner, 2005), social and cultural values (Fletcher et al., 2017) and environmental hazards (Ghalia et al., 2019). Those effects might also impact other economic growth factors notably human capital.

A study on the expansion of tourism in the Chinese economy reveals that inadequate institutions, pricing swings, and an oversaturated population negatively affect human capital (Deng et al., 2014). While looking at the methods used to estimate the impact of

tourism expansion on economic growth, the most common technique is to do a Granger causality test with time series data, usually within a vector error correction model framework (Balaguer & Cantavella-Jorda, 2002; Pavlic et al., 2015; Ridderstaat et al., 2014; Sanchez Carrera et al., 2008; C. F. Tang & E. C. Tan, 2015). However, recent research has utilized advanced time series methodologies, including time-varying models, to inquire into tourism's impact on economic growth (Antonakakis et al., 2015; Arslanturk et al., 2011; Balcilar et al., 2014) nonlinear models (Brida et al., 2015; Phiri, 2016; Wang et al., 2018; Wang & Bramwell, 2012) time-varying copula functions (Perez-Rodríguez et al., 2015) and a VAR-based spillover index approach (Antonakakis et al., 2015). Panel data techniques are applied to data from a selection of countries in order to learn more about the association between tourism and progress (Aslan, 2014; Lee & Chang, 2008; Narayan et al., 2010; Sequeira & Maçãs Nunes, 2008; Tugcu, 2014). Evidence for the TLG hypothesis has been found most convincingly in studies utilizing panel data.

1.2.4. Infrastructure, Information, Communication and Technology (ICT) and Economic Growth

The traditional infrastructure (transport, energy) is considered an enabler for economic growth (Munnell, 1992). Achieving sufficient level of transport and energy facilities in any country is precondition for economic activity. Nevertheless after reaching certain threshold of development in traditional infrastructure a diminishing marginal benefits are observed (Deng, 2013). In more developed economies it is often the new infrastructure related to ICT which provides for higher economic growth potential. It is also brought forward that country's human resources and research play a crucial role in the nation's ability to absorb new technology effectively (Fagerberg, 1994; Verspagen, 1991). The factor might be as well intertwined with financial development factor as some research suggests that in order to make the most of technology, it is necessary to pay attention to the role of financial development (Aghion et al., 2005) as well as governance and national institutional contexts (Eslava et al., 2011; McMillan et al., 2014). Due to this, the lack of financial development and R&D services in developing countries do not enable them to absorb technology effectively, thereby showing no association with economic progress.

The impact of new infrastructure and its connection to economic growth gained increasing attention in the XXI century. Bougheas et al. (2000) found that investments in communication and other infrastructure can significantly impact operational expenses. As

explained by (Metcalfe, 2006), information and communication technology (ICT) is another example of technological advancement that promotes the dissemination of knowledge, the development of expertise and new ways of doing things, and the liberation of individuals. After that, Czernich et al. (2011) provide a more descriptive account of ICT and its connection to brisk economic expansion. Dutta and Coury (2002) significantly identified many benefits that may be gained from ICT. Time savings, cost reductions, enhanced health care, increased market knowledge, and faster access to information are just a few advantages that can be gained from this.

Bougheas et al. (2000) investigated the relationship between the development of telecommunications and the expansion of economies. He evaluated a sample of 119 nations from 1960 to 1989 and discovered that mobile phone connections constitute a significant part of telecom infrastructure and have a long-run association with economic growth. Seo et al. (2009) discovered a connection between ICT and economic development by analyzing data from a sample of 29 different countries. Mehmood and Siddiqui (2013) revealed supporting insight for the association between increased communication and economic development in their research. Chien et al. (2020) was looking at the role of the transmission of information and communications technology in expanding the economy.

Using data from 61 developing nations and 23 wealthy countries, Flanagan and Jacobsen (2003) examined the connection between telecommunications infrastructure and economic growth. He found a positive association between the two variables. Not only that, but he also offered empirical evidence in favor of the claim that emerging economies are prospering more quickly than developed ones. On the other side, Niebel (2018) rejected the leapfrogging hypothesis, which said that the influence of ICT on economic growth would be different for industrialized and developing countries. He found that the influence of ICT on economic growth was the same for both types of countries. It has been found by several researchers (Keller, 2004; Twining & Henry, 2014) that the leapfrogging hypothesis is effective depending on the capacity and adoption of technology in each country. Another study has shown that a country's ability to develop ICT infrastructure and enjoy its many benefits is, therefore, highly dependent on its policies and strategies.

Chavula (2013) analyses the impact of mobile and fixed phone users on overall economic growth. As per this research, there is no link between the number of internet connections and the economy's expansion. The research conducted by Haftu (2019) on the areas of Sub-Saharan Africa found that the number of mobile phone customers has a significant effect on per capita income. Feng et al. (2016) employed the Cobb-Douglas production function to explore the influence of the internet on economic growth in a Chinese province. He found a positive correlation between the two variables.

In addition, Harb (2017) looks at this study from 1995-2014 into the Arab world and similar study is conducted for the Middle East (Pulina & Cortés-Jiménez, 2010) both acquiring positive relationships of ICT and GDP. To further investigate the role of telecommunications in fostering economic development, Alahmad et al. (2016) focused on SARC (South Asian Regional Cooperation) countries – again concluding a positive relation. Another studies confirming the link between infrastructure and specifically ICT related infrastructure investment and GDP growth can also be brought up (Czernich et al., 2011; Koutroumpis, 2009; Shahiduzzaman & Alam, 2014).

However, there is also a negative correlation between ICT and GDP found in Malaysia study (Kuppusamy et al., 2009). Like this, Dewan and Kraemer (2000) claim that the development of ICT has little impact on developing nations. Recent research from 15 MENA regions found no correlational impact of broadband access and regulations on per capita income (Ghosh, 2017). Limited effects of ICT on FDI (and indirectly on GDP) were reported by Gholami et al. (2005). The role of ICT transition in Japan was studied and found no conclusions (Ishida, 2015). In addition, findings were contradictory in the research carried out by Cheng et al. (2020), based on the panel data of seventy-two developing nations from 2000 to 2015. Moreover, a study (Grünwald et al., 2018) discussed complexity in the results between these two factors. Few studies point to a potentially dangerous confluence of the ICT revolution, cybercrime, and social and economic categorization (Echeverri & Abels, 2008; Ferro et al., 2010).

Therefore, the literature defines the consequences of ICT in a very inconclusive way. Each economy and geographical area will experience the effects of ICT differently. The state's actions, society readiness to use ICT and their quality and planning determine how well citizens are competent to use information and communication to boost the economy.

1.2.5. Trade and Economic Growth

Investment prospects, manufacturing procedures, resource utilization, and the application of talents and experiences are essential tenets of the trade theory, which explains why trading boosts economies. In today's literature on economic growth, discussions of the importance of trading policies in fostering rapid GDP growth are frequent and base on the original Ricardo's theory, which expresses how to facilitate goods flow between states so that they can pool their limited resources and advance their manufacturing.

Neoclassical growth models, based on the model proposed by Solow, did not consider the relationship between trading policy and economic growth as a causal factor (1957). On the other hand, modern theories accept this relationship's presence and believe that domestic economic policy is intertwined with global business.

The anticipated simulative effect that trades liberalization may have on economic growth has garnered widespread recognition in recent years. It posits that as resources in locations with comparative disadvantages become redundant, they will be moved to places where they will be more productive. It will reduce the adverse effects in the short run and make it useful in the long run; the evidence points to a J curve-type response (Falvey et al., 2012; Greenaway et al., 2002).

In addition it is necessary to cultivate productive factors such as a technically trained workforce and innovative productivity in order to achieve sustainable growth over the long run (Kim & Lin, 2009) and the liberalization of trade is an essential aspect of the process of modernizing those production factors.

Various theoretical and empirical arguments have been presented in support of or in opposition to the liberalization of trade. It is mostly advised in temporary literature, that trade regulations be flexible to allow for more accessible transportation of goods from businesses to locations where they can be put to the most productive industrial use (Freund & Bolaky, 2008). In its extreme, trade liberalization might fuel the economic crisis. In order to distinguish between crisis and non-crisis regimes, and to determine the values of crisis indicators Falvey et al. (2012) used threshold regression approach and their research shows that a financial crisis occurring during liberalization might hinder growth in the years after the shift; however, the specifics of this impact depend on the type of crisis. Internal crises are linked to weaker growth relative to a crisis-free regime, while external crises are linked to higher growth.

Fosu (1990) investigated the expansion of African countries using an augmented production function and found that higher levels of export activity are valuable contributors to economic expansion. However, Ulaş (2016) using a dynamic panel data framework proved that the measures used to describe the effect of trade openness on economic growth are ineffective and concluded that trade openness alone could not play a significant role in economic growth. Trejos and Barboza (2015) also proved empirically that trade openness is not the primary driver of the Asian economic growth "miracle". If the economy is to thrive in the long run, it must become more trade-friendly, but specific rules and regulations must be put in place (Newfarmer & Sztajerowska, 2012). Kim and Lin (2009) research conclude that trade openness is important for long-term economic growth, however its impact on development levels varies. According to Herzer (2013), trade openness impacts high-income countries more than low-income ones. Another study shows that different degrees of trade openness affect economic development. Hence the benefits of trade openness are maximized up to a certain point of high income and then decline (Agénor & Aizenman, 2004; Liang et al., 2006).

Trade and growth are mutually beneficial - as acknowledged in the majority of academic literature. Trade requires more resources and infrastructure, which developing countries can only afford to a limited level. Hence wealthy countries are reaping more benefits from trade openness than developing countries (Kim & Lin, 2009). For instance, for the G7 states, an explicit positive association between openness and economic growth is a fact (Zeren & Ari, 2013).

Current scholarly literature continues investigating the link between trade and economic growth but employs a wide range of novel indicators and methods. Even though numerous empirical researches have employed cross-country growth regressions to defend the positive impacts of trade on economic growth, these findings have been often devalued by the academic community due to poor data quality and insufficient endogeneity control (Edwards, 1998; Le Goff & Singh, 2014). Winters et al. (2004) pointed out that the dynamics of trade and its corresponding regulations and laws are not easily analyzed using linear regression models (which are frequently applied in the studies of the phenomenon) due to their customized structure. A further explanation for the inconclusive results is provided by (Greenaway et al., 2002), who state that this was due to the deviation and multiplicity of indicators of trade openness. Their assessment of the effects of trade liberalization employs a dynamic panel data approach and three distinct

metrics; the results reveal a positive correlation and a back log. In other words, they identify positive relation between trade and economic growth but claim that the effects are much delayed in time. In addition, they demonstrate that panel data analysis is preferable to cross-country research due to its ability to generate more exact findings and estimates. It is evidenced by the fact that panel data analysis has been proven to give more accurate results. Summing up the above discussion, and given the controversy it produces, in order to account for possible effects of trade on the economic development, the current research will use trade indicator as a control variable.

CHAPTER 2
HUMAN CAPITAL AND ECONOMIC DEVELOPMENT

2.1 The Role of Human Capital in Economic Development

The term "human capital" encompasses people and their education, health, on-the-job training, and the skills acquired through social interaction. This economic concept has been in use for at least two centuries, but it has only recently gained more attention in economic analysis and research. The need to account for human capital in economic development arose in the 1950s, as empirical economic research highlighted major flaws in our understanding of economic growth and income distribution. In technical terms, human capital is the collection of innate abilities, education, experiences, and a continuous process of learning and growth that people go through their lifetime (Laroche and Merette, 1999).

Among early economists, Fisher (1906) discussed the importance of human capital and identified two significant challenges that highlighted the necessity for its further development, which required the abandonment of two simplifications: (1) limiting the concept of capital to physical assets, and (2) assuming homogeneity in labor that forms the basis for functional income distribution and labor input measurement in man-hours. Fisher's definition of capital as any asset generating income necessitates the inclusion of human capital, even though it cannot be traded like other assets and its investment often involves non-market activities. Despite difficult measurement problems, investments in human capital are amenable to economic analysis, as they involve costs and returns, whether implicit or explicit. The payoff of this approach is evident in both macroeconomic and microeconomic contexts: (1) at the macro level, the social stock and growth of human capital are essential to economic growth, and (2) at the micro level, individuals enhance their skills and expertise and grow faster by acquiring better opportunities, leading to growth in their human capital and high wage structure and income distribution.

According to human capital theory, investing in people is one of the best ways to boost a country's economy (Eslava et al., 2011). A strong emphasis on human resource development is essential for achieving substantial economic growth (Aghion et al., 1998). In addition, Romer (1990) endorses the growth model of economic development which stresses the importance of

putting more significant effort into technological progress to build human capital. Recent research has in turn highlighted the importance of education as a vital tool for maintaining economic growth processes (Appiah-Otoo & Song, 2021).

Up until the 1980s, the prevailing neo-classical growth theory largely credited economic growth to factors like technology and population growth. These were often seen as external elements in economic models. However, modern growth theories countered this by suggesting that if we only consider factors like savings, the capital-labor ratio, and income, then countries should eventually reach a uniform development level over time. Challenging this perspective, endogenous growth theories put forth the idea that internal, or endogenous, factors can shape a country's economic trajectory. These factors include human capital, international trade policies, the evolution of the financial sector, and government spending patterns. Central to this understanding of is the role of healthcare and education. Both are deemed crucial in shaping human capital, which, in turn, has a profound impact on long-term, sustainable economic growth. Instead of just looking at traditional measures like literacy rates or average years of schooling, indicators of human capital have expanded to encompass government spending on education and health. This shift underscores the importance of viewing human capital not just as a metric of economic potential, but also as a reflection of societal well-being. After all, the health and education of a population are primary markers of its economic development and welfare. Recent studies recommend using educational and health indices as representative measures to explore this intricate relationship. (Ferid and Zefer, 2013).

Countries with more advanced economies are investing more resources in developing their workforces in order to increase output. The early benefits of the baby boom generation's entry into the labor force were enjoyed by the developed world, leading to sustained economic growth (Shittu et al., 2022). Consequently, the developed world is taking significant steps to improve their workforce, such as increasing college enrollment and government spending (Abate, 2021). As a result, these economies are gaining a competitive advantage in the global market due to the rising number of college-educated workers (Thinagar et al., 2021). Emerging nations face two primary obstacles in adopting those strategies. The shortage of skilled workers and inadequate medical facilities, which hinder their progress. To overcome these challenges, good governance and a strong financial system are critical factors for success (Mohiuddin et al., 2022). In developing countries, the sick and less-educated workforce tends to devote more time to non-productive socio-economic activities, which slows down economic progress (Dinh Su & Phuc Nguyen, 2022). Considering that the primary objective of the research conducted in

this thesis are Balkan countries analyzed against the background of the EU it is important to consider both theoretical insights. Thus following the above discussion both approaches deemed important for analyzing human capital context in developed and less developed countries have to be factored in.

Arora et al. (2000) discussed the issues of developing countries where government spending on health and education provides provision to the needy people and assist them to upgrade their standard of living. He also studied the effect of health on income in developed countries and found long term relationship between these two indicators. According to the endogenous growth theories, it constitutes a crucial component of GDP. Another study by Arora et al. (2001) also proved that health improvements drive economic expansion.

Oluwatobi and Ogunrinola (2011) also conducted an econometric analysis of economic growth in less developed environment taking two samples from Nigeria from 1970 to 2008 and 1977 to 2007 as a study data. Using the Johnson co-integration method, they found that ongoing government spending on improving human capital positively correlates with actual production but spending on physical capital negatively correlates with GDP growth.

Integration of human capital into a model-based approach in the research on economic growth faces some challenges. The importance of education has been emphasized heavily in the modern world's most prosperous countries. Therefore, it is anticipated that the observable outcomes of education will correspond with the behavioral tendencies demonstrated by those who have undergone a structured educational process (Azimjanovich, 2022). All classical theories are based on, either certainly or unequivocally, ideas about human behavior. This human behavior could be considered a result of human capital – or the way it was formed through education. In classical theories it is assumed that better education promotes more rational behaviors (Santos Silva & Klasen, 2021).

The academic literature presents a range of empirical evidence demonstrating the value of human capital for economic growth, with somewhat conflicting conclusions. Mankiw et al. (1992) used a cross-country regression analysis to determine the relative importance of human capital to national GDP. They concluded that a rise in human capital is strongly associated with higher average incomes.

Dorian et al. (1997) used education and health as explanatory variables in a neoclassical growth model. Researchers found an association between higher income and better health, whereas there was no correlation between better education and rapid economic growth. There is a

relative lack of studies examining the connection between education and economic growth in emerging nations, as discovered by Ahmad and French (2011). The evidence from low income developing countries is often country based and frequently lacks of rigorous data selection procedure. However, the literature on economic development has explored well the effect of education standards in industrialized countries. The specific factors which contribute to the human capital are mainly education and health. However, there is a variety of research trying to understand how that two-influence buildup of human capital in economy with sometimes contradictory conclusions. In the subsequent paragraphs some examples of those discussions are provided from both high- and low-income countries perspectives with the goal of understanding which components should be modelled for the purpose of human capital-based analysis of the economic growth for the Balkan countries setup followed in this research.

Earlier studies (Lucas Jr, 1988; Romer, 1990) have focused on the benefits of education to encourage human capital development and positively influence economic growth. Barro et al. (1992) performed a calculation to determine the worth of education and analysis to determine its effect on the economy. He reasoned that the actual per capita production would expand quicker if more people were getting an education. He also highlighted the importance of schooling investment to bridge the gap in development levels between countries with low and high incomes. An additional study measuring education at different levels (primary, secondary, and tertiary) was commenced by Barro (1996). A positive and statistically significant relationship between education and GDP growth was found in his analysis, which spanned the years 1960–1990. He used a simple panel regression analysis to conclude that human capital investment is the most crucial factor in sustaining economic expansion over the long run. The final conclusion from those studies was that only developing countries with skilled and reformed labor could hold their own against advanced economies.

The building blocks of a better life are a good education and good health, which guarantee more employment opportunities and a higher quality of life. People are more motivated to eat healthily as their standard of life improves and they gain access to more financial resources. A rising life expectancy and better living standards are both excellent for a growing economy (Fogel, 1997).

Ramirez et al. (1997) investigated the bi-directional relationship between human capital development and economic growth. He suggested that human capital affects economic growth, on the other hand, economic growth affects human capital. This two-way connection has the

potential to set off either positive or negative spirals of development. This idea demonstrated that countries who put more emphasis directly on economic growth processes might not be as successful as those that put more emphasis on human resources development.

Benhabib and Spiegel (2005) also studied the relationship between human capital and economic growth and discovered a significant association between the two. According to their findings, the increase in human capital affects the rate of technological advancement. Hence this demonstrates an indirect relationship between these two macroeconomics variables. Between 1971 and 1998, OECD nations were analyzed to determine the impact of human capital on economic growth. They found that education raises per capita income by 6%.

Classic economists Smith (1776) and Ricardo (1955) contributed the concept of an increase in wealth per capita with the production increment that supports economic development. The classical theory defines economic growth with significant factors of production such as labor, capital and productivity time. Smith's perspective gives rise to the theory of the growth process and advocates for the notion that knowledge, skills, and expertise contribute to the increase of production processes and quality of output. Furthermore, this theory established that worker compensation should be commensurate with their exertions and energies. Hence, the allocation of resources towards human capital is closely associated with the educational and learning processes, resulting in increased income prospects for those with advanced skills. Another famous economist, Keynes, discussed the law of demand and explained that aggregated change in demand increases the economy's wealth. Keynes (1924) presented a model with the formula of multiplying investment growth to increase income. Yet, those early theories simplified human capital as labor. Later, Harrod-Domar's model examined that investments were derived from the savings taken by the household and business activities. The model perceived that the process of transforming savings investment opportunities and this cycle of reinvesting impacts economic growth but it did not incorporate human capital. Only aligning the model with Keynes's study resulted in further examination of the financial conditions for sustainable economic expansion and clarification how investments, human capital, and technical advancement are the main drivers of economic growth.

Another of the major early economic models – Goodwin model by Goodwin (1864) elaborated the strong relationship between investment and income for economic development. Goodwin's model's significant factors are production capacity, monetary benefits, labor income, and consumption. Based on the theoretical framework, it is posited that a consistent level of output

can invariably be transformed into an equivalent level of capital, whereas real wages exhibit a shifting pattern in accordance with the Phillips curve. This economic model postulates that wages tend to rise as the economy approaches full employment. Thus, human capital is again simplified and equaled to the labor.

Perroux (1950) defines *growth rate* as the proportion of the total number of products and the period allocated to generate these products to increase economy size. Overall, the concepts demonstrated productivity, capital and labor as essential sources of income. According to Perroux, these elements were considered fundamental and allowed for his attempt at modernizing general equilibrium theory. The continuous development cycle, in his view, was a powerful foundation for societal improvements, and his research also showed that human welfare was a mean to enhance economic productivity This approach does not relate to human capital directly but rather treats it as a total well-being of employees.

From the more modern economic ideas Acemoglu and Robinson (2002) made their opinion based on the level of production and development of innovative platforms to generate cost-effective production processes. Their research consistently points to the importance of institutions in fostering economic expansion by shaping the incentives for human capital, investment, and technical development. Another recent study following in the footsteps of classical economists, states that economic growth is based on the production factors and macroeconomic effects such as GDP, Gross National Product (GNP), and National Income (NI) as a whole and on average (Martín, 2022). But economic advancement can be only achieved with increased production. And for that the study emphasizes the importance of human capital, which refers to knowledge and expertise, in consistently understanding and identifying the strategic resources required to sustain a competitive advantage.

In the economics literature which concentrates on development, human capital gains much more attention than in the works which deal exclusively with economic growth measured through classic variables of GDP or income. Human capital theory is major part of development theories and views human capital as an important driver of economic growth (Wang et al., 2022). The theory advocates one-directional causation between human capital and economic growth. Research studies in the strand argue that human development becomes important in this regard as those societies with more education are believed to be more productive, responsible and innovative leading to the creation of new ideas and improved ways of doing

things (Han & Lee, 2020), which create a favorable environment to achieve sustainable economic growth (Ogundari & Awokuse, 2018; Rahim et al., 2021).

Finally, it has to be mentioned that there are some – although minority-studies which demonstrated either a negative or zero correlation between human capital and economic growth. There is no correlation between human capital and economic expansion, according to Benhabib and Spiegel (1994). Similarly, Filmer and Pritchett (1999) discovered no connection between increased schooling and a flourishing economy. Lee and Lee (2016) took a dynamic method to study the impact of human capital on GDP growth and found no association. Human resources do not correlate with economic growth, as determined by Amassoma and Nwosa (2011), using vector error correction and pairwise Granger causality.

2.2 Measures of Human Capital

Human capital is an impalpable basis accomplished jointly by the individuals and groups within the populace. Human capital framework is composed with school attendance, healthy livings, skills development and social norms. Thus, the potential candidates for measurements of the human capital could be education, health, skills and competences. Those could be in turn assessed either directly (by subsequent ratios – if available) or indirectly by capturing factors which contribute to education, health etc. Finally, a commonly applicable proxy for any economic process is a total monetary value of this process.

Out of the abovementioned elements one seems to be of utmost importance – education. The World Bank recorded the positive impact of education on the workforce and reported that higher educated workforce income level was much higher than secondary education personnel. Higher-educated workers produce double that of people with secondary education (Dinda, 2004). Another study investigated that as much as 84% of production increase is associated with employment of highly educated people. Moreover, even people with incomplete studies after college education contribute 16% more than those who only did schooling (Benigno et al., 2022). The rapid decline of industrial jobs is another evidence of the importance of education to the economy (Bisin & Verdier, 2022). In United States (US), people who have college degree achieved more opportunities to get work in technical fields. Patent creators with at least bachelor's degree are recorded at 92%, and manager-level positions are predominantly occupied by people with four years of university education. The National Assessment of Educational Progress survey report analyzed that the US economy might grow by $32 trillion if 14.6 % of

students perform proficiently in all core subject areas and their test score could be considered a significant factor for economic growth (Lavonda, 2018). The US evidence points out also to the observation, that economies can benefit more by investing in secondary and elementary education and reducing gap between them and tertiary education levels. (Kurita & Managi, 2021).

Education leads to enhancements in human development, which also increases economic activities. According to the study of Soviz & Chavooshi (2019), the essence of human capital development is a process of strengthening human capabilities. It has also important personal dimension. To maintain the standard of living, effective resources are significant along with other social values of a human beings to develop their physical and emotional strength. Health, family, education, income, safety, and freedom are fundamental desires of an individual and play a crucial role in forming human capital. It defines that skill development and motivation drives toward an effective workforce and in turn reduce poverty in the same time creating economic growth (Khan et al., 2022). Abidegi and Bamedele (2003) highlighted the integral role of education in economic growth. The authors further argued that if a significant proportion of the population took advantage of educational opportunities, the outcome would be heightened productivity and subsequently economic expansion.

This relation is visible not only in countries with high level of organization of economic life (like US) but also in middle and low-income economies. A study was analyzed in China during 1997-2015 using the vector auto-regression model to observe the connection between higher education, modern technology and financial outcomes. The results show an interaction mechanism featuring dynamic circulation and its ability to utilize resources for enabling economic activity (Hoang, 2021).

The human capital impact for high, middle and low-income countries might be subjected to economic complexity. The degree to which economic institutions and activities are intertwined might impact how well human capital potential can be utilized. This complex relation is addressed by the study considering the economic intricacy of 210 nations and inspecting the effect of economic intricacy and human capital on economic growth (Chalmers et al., 2021). The assessment conclusions demonstrate that there are noteworthy variances concerning the level of intricacy and human capital utilization among nations. High-income economies have higher intricacy than low and middle-income economies. The experiential results validate that more economic intricacy and more diverse human capital have both positive impacts on long-

term and short-term development. This relation is reinforced by another study (Bigerna et al., 2021). The effect seems to be even more visible as the relative difference between economy's growth levels. Relative advantages in the long- and short-term development effects increase as economic complexity rises, when human capital is considered (Zhou & Luo, 2018).

Despite those reported effects of scale, the positive role of education for the building of human capital and its association with economic development could also be confirmed for low-income economies. Specific problem of education from the perspective of low – income countries is related to proper timing of education. Krueger and Lindahl (2001) state that education may not be worth the investment in later phases of development. As a result, low-income nations need to raise educational quality early. In their research, Krueger and Lindahl (2001) discovered consequences for developing countries, stating that investment in education is costly and developing countries cannot afford it. Although it is clear that investing in human capital is essential for long-term economic success, developing countries with few resources are often hesitant to make such an investment. Despite the enormous returns on investment expected from spending money on education in the long run, there is a significant opportunity cost in the short term because this money could be put to satisfy immediate needs. Microeconomic studies on Africa have been carried out in considerable depth, in contrast to the macroeconomic research that has been done often on larger regional samples. The findings consistently show the trade-off dilemmas. For example, in Sub-Saharan Africa (SSA), there is a need for additional incentives to motivate students to continue their education. When comparing the benefits of various levels of education, the foregone wages for younger children are lower than for older children, implying that primary-level education shows a more significant return (Psacharopoulos, 1994).

Denison (1964) recognized the need for education for a thriving economy. He found that educated workers boosted U.S. revenue by 23% between 1929 and 1960. In 1974, he repeated the analysis and found similar results. Education is a crucial component of economic success, despite the qualitative characteristics of human capital. Another finding of the research also indicates that people with higher levels of education have a greater likelihood of receiving compensation that exceeds their marginal production. The available data suggest that the discrepancy between pay and productivity among different educational classes may be considerably affected by the age and gender of workers (Lazear & Rosen, 1981). A substantial correlation between worker education and compensation was reported by Sultanuzzaman et al. (2019).

Empirically, another set of studies is worth quoting. By employing multivariate regression analysis to examine the impact of human capital stock and the presence of higher education institutions on the quality of life in metropolitan areas within the US, Winters (2011) assessed variations in quality of life by analyzing disparities in real wages. The study focused on examining the relationship between the accumulation of human capital and the existence of institutions of higher education. Another analysis was conducted using data on the percentage of the population with various levels of education, the average number of years people spend in school as adults, and the amount of money the government spends on education. Accordingly to its results, the economic growth in SSA countries was positive and significantly correlated with the proportion of the population enrolled in primary and secondary education and the average number of years spent in school (Ogundari & Awokuse, 2018). Additionally, authors concluded that education and health are the primary determinants of human capital, and these elements are not replaceable.

Several studies have emphasized the association between higher education and economic development worldwide and examined productivity as a variable to measure economic development (Adams et al., 2022). Another scholar, Keji (2021) observed the relationship between educational investment and economic development from 1986-2014 in Nigeria and he employed the variables of education spending, health and GDP. The author recommended that appropriate budget allocation to increase education and health facilities for the people of Nigeria is required, and government should take necessary actions to formulate skill development centers to improve labor productivity and sustainable economic growth. Similarly, Adejumo et al.(2021) conducted research in Nigeria to analyze the impact of university level degree on economic output. The study supported the hypothesis and concluded that higher education improved economic growth as predicted by the Solow theory.

Based on prevailing amount of research it is evident that nations must allocate resources towards fostering their future economic well-being through the provision of higher education opportunities to their populace. In the year 1948, Korea was classified as one of the least developed countries globally. The governmental authorities of said nation, however, implemented a strategic approach of allocating resources towards the advancement of education and enhancing its accessibility to a broader population. Consequently, the country had a notable socioeconomic transformation, transitioning from its status as the most impoverished nation globally to attaining the fifteenth position in terms of economic prosperity. In order to enhance

long-term economic growth and ensure sustained benefits, the South Korean government implemented a higher education system in 1980 (Mamta Murthi, 2021).

But the relation holds even for current lowest income economies. Human capital and economic growth relationship was examined in Zimbabwe during 1980 to 2015 following the proxies of government spending on health and education. The study concluded that expenditure on health shows statistically positive effect on economic growth. However, expenditure on education have a weak connection in the long run. Overall, human development and economic growth have positive relationship (Mohamed et al., 2021). The average weighted education level was used as a proxy for human capital and found positive relationship between these variables. Another research was conducted by Kazmi et al. (2017) to measure the human capital and economic growth nexus. The findings of the study indicate that total investment on education have positive relationship with economic productivity in the long run. Thus, government strategies and supporting decisions were considered more crucial to sustainable economic growth. Therefore, it is proved that government quality and its ability to effectively formulate policies which allow for utilization of existing human capital cannot be omitted as well.

In addition, Mousavi & Clark (2021) conducted a study in China to analyze the governance quality relation to GDP growth rate. The study collected data from 2001-2015 based on regions to understand regional governance importance toward increment in local economy and found a robust relationship. The analysis describes the importance of authority and power of the government plays a fundamental role to groom economic needs. Further, it is demonstrated that high speed economic development leaves less impacts but high-quality institutions leave more impact (Nguyen & Su, 2022). While comparing this effect on eastern and western regions, Buracom (2021) suggests that high quality governance could be a differentiating factor if education in the economy plays a role of fixed asset. Therefore, the Chinese studies reinforce the notion, that the improvement in local governance quality leads toward efficient and capable generation of human resource (Wang et al., 2018).

There is sometimes a differentiation applied to levels of education. Nainggolan et al.(2021) analyzed the involvement of universities for economic growth during the period of 2000-2015. For this purpose, the R & D of educational institutions and technological advancement of European nations was discussed. In the paper, researchers proposed employing neoclassical growth theory to check the effects of HEIs (Higher Education Institutions) in hypothetical scenarios, which envision a world without HEIs and suggested that these are crucial for the

development in the EU countries and play key role in avoidance of the effects of crises. The data analysis from that study shows that GDP per capita is 11% higher with than without HEIs.

The impact of regional higher education systems on economic growth was also identified by Agasisti & Bertoletti (2022). The researcher examined a sample of 284 observations within European regions spanning the period from 2000 to 2017. The findings indicate that a higher concentration of universities within a region is positively associated with enhanced economic growth in that particular region. The favorable impact of universities on regional economic development is mostly driven by the quality of research and a focus on specialized fields in science, technology, engineering, and mathematics (STEM). Furthermore, higher education is measured as a driver for enhancement and development in the intellectual society because of its advantages to enhance study, knowledge, and technological modernization.

Bouhajeb et al. (2018) evaluates the association between innovations in higher education, and economic development during the 1996-2014 years in developed and developing nations. The co-integration association between series was inspected by applying a panel co-integration test with results confirming positive association of innovation in tertiary education on economic development. Another study (Oancea et al., 2017) identifies the causality and the long-run association between economic development and higher education in the Czech Republic and Romania, applying the 1980–2013 years. It concludes that higher education has a significant positive impact on economic development, but exact strength of the effect on economic development is different in the two nations.

Vast research has contributed to develop relationship between education and regional economic growth. Aleixo et al., (2018) elaborated the tertiary education and economic growth in Europe during 1998-2008 and observed the enrollment rate of the students in tertiary education and their relationship with skills based working platforms in different regions. This skilled employment structure is directly associated with the GDP increased rate and R& D cost.

The discussion on the difference between primary, secondary and tertiary education role is followed by Hanushek & Woessmann (2008) who state that higher education gives more advantage to the pupils and promote more rapid economic growth. Appropriate skills program and knowledge gaining through schooling to develop economic outcomes are compulsory in modern state. However, adding years of schooling without considering skills will not result in significant improvements in production output.

It is interesting to observe, that the role of higher education was considered important (judging by financial expenditure) by governments of countries which were experiencing the most rapid economic growth over past decades. For example, the Chinese government had significantly augmented higher education in the last two decades. The higher education system of the country has been transformed to mass form. Higher education's massification has offered numerous accesses to junior colleges and academies and later formed a rising quantity of college graduates seeking jobs in the labor marketplace (García-Morales et al., 2021).

The mass education produces however the risk of low quality. This process has been witnessed in China leading to extensive discontent of employers with the higher education standards. Yet in developing countries without long education tradition, it has to be factored in, that students coming from diverse family upbringings may impose varied challenges in higher education admission and later in the graduate employment. Encouraging educational equality when higher education is enormously extended is therefore one of the key problems in building effective human capital (Mok & Jiang, 2017).

The relationship between worker knowledge, expertise, experience, and output rate is investigated by Siddiqui & Rehman, (2017). Economic growth is more likely sustained in industrialized countries with a highly educated workforce than in East Asian countries where most of the labor force has only completed elementary and secondary school. Abbas et al. (2020) examined the influence of secondary and higher education on production in Pakistan and concluded that it had a significant positive effect. According to the research (Ulaş, 2016), primary education is crucial to the growth of the Indian economy. Similarly, Liang et al., 2010 confirms primary school's positive impact on development.

Another direct measure of education’s role in shaping of the human capital is reflected by financial contributions. Remuneration gaps between employees with a college or graduate degree and those with only a high school degree increased swiftly in the U.S. during the 1980s. Since then, the rate of development in these remuneration gaps has gradually decelerated, nevertheless, the gaps continue to be large. Valletta (2018) evaluates this flattening over some time in higher education remuneration percentages concerning two related descriptions for varying U.S. employment outlines: (i) a move away from middle-skilled jobs driven chiefly by technological variation and (ii) a general reduction in demand for advanced reasoning skills ("skill decline"). Studies of remuneration and hiring information from the U.S. Current Population Survey recommend that both features have subsidized the flattening of higher

education remuneration premiums. Hence, higher education plays a vital role in employment. From the more international perspective, Schulze-Cleven & Olson (2017) discovered the critical significance of specific employees group - industrial experts within the education system in US, Germany, Norway. But again while significant in all countries, the strength of their impact on the economic expansion was varying in different regions.

Another avenue of research leads to the human capital (measured through education) and political development factors association. Zembylas (2022) employed cross-country analysis with binomial regression models to evaluate the relation of terrorism with the educational system. The nations not giving much concentration to driving an educated atmosphere are facing increased terrorism intensity. It creates political disorder, a reduction in investment opportunities, and market instability. Further, the urban communities where this haphazard situation exists in turn report that it affects the primary level education further reducing educational opportunities. Thus, it could be concluded that education is an important enabler of peaceful conditions which are prerequisite to economic growth in developing countries, but this relation could be two-directional. Generally, terrorism fear would not allow developing countries to focus on the official education system attentively. Similarly, Soncin & Cannistrà (2021) observed that primary-level education is highly affected due to terrorism fear. Moreover, other developmental factors' tend to be affected in volatile economies with low education levels, and it becomes difficult to handle unemployment, inequality, income standards and market stability in this type of countries at the same time (Yıldızer & Munusturlar, 2022). Abovementioned work provides empirical analysis which defines a strong link between decrease in GDPs per capita and the increasing rate of a terrorist attacks. This effect can be further defined by the number of years spent in school. Statistical analysis results conclude that the average number of schoolings increased with the reduced rate of terrorist attacks, and the economy's output rate increased. In contradiction to the main body of research on the topic, as per results of Lee et al.(2022), the findings are not consistent and fluctuation for different countries is observed because there is a significant difference in the levels of unemployment and political measures aimed at combating terrorism in developing nations.

Another example of the human capital development as a central aspect in defining and driving the production level comes from the financial sector analysis and is based on the research which examined the Saudi Arabian region from 1970 to 2017 with the ARDL cointegration procedure (Deschacht, 2021). This research examined the human contribution to financial market development to increase economic impact. The results indicate that this relationship is positive

and meaningful for the Saudi Arabia's economic growth. Financial development is affected by technological advancement and educational support. The study is confirmed by another piece of research claiming that educational support promotes modernized technology, leading to financial growth (Langroodi, 2021).

The study of Elheddad et al. (2021) shows that in the long run, the financial market development (FMD) enhances economic growth when a number of business school graduates increases. Its enhancement will enhance economic growth at a higher stride as an upsurge of 1% in FMD relating to human capital will upsurge economic growth by 0.688%. The results suggest that there is much attention required to invest in educational strategies and conduct training programs in order to improve human capital efficiency in specific sectors of economy (Mahmood et al., 2019). Another testimony to the role of financial sector and its educated workers is Ibrahim (2018) study which claims that there exists a significant correlation between economic growth in SSA nations with the presence of human capital and financial development, both in the short and long term. The author posits that financial development exerts a significant influence on growth, owing to the potential for cultivating a skilled labor force through inventions and the adoption of advanced technical equipment, which is only possible through using financial sector.

Another important contribution of education to human capital is its ability to foster entrepreneurship. A study setup in China looked for entrepreneurship and small-medium eEnterprises(SME) in Chinese provinces. The correlational form of recursive model path investigation was used as a research technique. The study outcomes demonstrate the very robust role of skilled people to lead economy (Bond, 2021). Another study (Wang & Yao, 2003) has established a correlation between the expansion of China's economy and the concurrent augmentation in the availability of skilled labor within the nation. The research revealed that the economic growth throughout the reform period was notably impacted by the augmentation of human capital and total factor productivity. During the pre-reform era, it had a detrimental impact. The assessments have yielded noteworthy changes in the proportion of GDP attributed to better skilled labor.

There is also a matter of specific entrepreneurship-oriented education. Despite numerous entrepreneurship programs that are established by the governments and HEIs to aid entrepreneurship drive, very little is known about the efficacy of entrepreneurship agendas application. For instance, in one of the well-researched programs of this type – whereas

Indonesian government was promoting business education, Stoica et al. (2020) uses case study approach to investigate effects. The research was carried out in two stages. The initial phase was the assessing phase. Data investigation concerning learning procedure within HEIs was assessed from the inner viewpoint and exterior viewpoint to get an improved understanding of learning experiences that aid in becoming efficacious entrepreneurs. The later phase was illustrative; allowing to determine, effects. Hence, it was assessed that entrepreneurship is a supportive process to develop human skills and expertise and contributes toward the human resource development.

Given the evidence of positive impacts education has on building human capital and in turn on contributing to economic growth it is becoming crucial to measure the strength of this impact.

Such an attempt at evaluating the educational system's contribution to the total human capital in the United States and gauging the growth rate of human resources and productivity output was started by Shultz et al. (1963), who conclude that the ratio is one-fifth. He also provided further confirmation that education has an economic function by contributing to the production of human capital, which in turn encourages the extension of economic activity.

According to Baldwin and Borrelli (2008), increasing education levels significantly affect economic growth in the United States but the exact numbers are not provided. Mincer (1958) developed a model to investigate what factors lead to wage gaps between workers of varying levels of education and experience. In addition, he looked at this variation from the perspectives of formal and informal education and the accumulated wisdom of the workforce. He reasoned that an individual's earnings and pay would increase proportionally with their level of expertise in their chosen field. Yet again the study lacks solid numbers supporting those hypotheses.

Thus, there is a significant gap in understanding not the how, but to what degree education contributes to human capital and consequently to economic growth. Moreover, the modern economies are (contrary to the mid-XX century research) accepting the equal role of women in workforce and increasing contributions of elderly – which distorts straightforward monetary impact calculations due to persistent inequality of salaries.

The degree to which elderly and women are included in the workforce has been only sparingly considered as a contributing factor in creation of human capital. One research claims that enhancement of female or elderly workforces' helps to upsurge combined human capital development (Han & Lee, 2020). Similarly, Mankiw et al.(1992) examined and verified the effect of men's and women's higher education on Greece's economic development over 1975–

2012. The study utilizes the procedure presented by Romer (1990) applying employment charges by gender as a substitute for the volume of human capital. Consequently, the study applies regression analysis to evaluate the role of education based on gender. The results disclose that there is no significant difference in productivity considering educated workforce by gender, taking distinct analysis of male and female into account.

Lent et al., (1994) provided a theoretical perspective on the challenges associated with making professional decisions, drawing upon the principles of social cognitive theory. The study suggested that contextual constraints contribute to the emergence of gender and racial disparities and those are negatively impacting economic performance of the companies. Swanson et al., 1996 also investigated the gender disparities among college students of European-American descent. Their findings revealed that female participants encountered instances of bias resulting in lower productivity. Another study (Russell & Rush, 1987) demonstrated that women face challenges in attaining their career objectives within management roles in corporate settings, primarily stemming from apprehensions related to societal expectations and the concept of femininity. According to Pastore (1982), the acceleration of industrialization and urbanization can be facilitated through the augmentation of educational attainment within the broader populace thus building less segmented human capital. It is suggested to confront the fundamental social and cultural barriers and to provide equitable educational opportunities for individuals of diverse racial, ethnic, and gender backgrounds for better productivity. Within the Brazilian context, a comprehensive study has revealed that marginalized groups persistently encounter discriminatory practices within employment, accompanied by an expanding wage disparity with overall negative effect on companies productivity (Barcelos, 2007).

Recent scholarly research has examined the issue of knowledge disparity resulting from biases towards gender or race and posited that expanding educational opportunities for all societal groups is crucial for fulfilling the demands of enterprises and fostering economic advancement. Education is pivotal in addressing social inequality, as evidenced by the scholarly works of Treiman (1970). The simultaneous expansion of education and industrial growth should contribute to the eradication of discriminatory practices, facilitate the identification of persons with exceptional abilities, and create opportunities for highly motivated individuals. Hence, is upon educators to imbue their students with the cognitive skills and societal standards that are useful for modern economics regardless of previous social conditioning related to gender roles (Debreen, 1968). Furthermore, it is emphasized that eliminating race and gender-based

discrimination should provide advantageous outcomes for the long-term development of the educational system and consequently will produce better quality human capital for economy.

A very few discussions exist to define public and private discrepancies with education. Glomm (1997) compared public and private schooling costs to conclude their effects on human capital, and the results suggest that more parental involvement in the public school system is a powerful motivator for their children to continue their education.

The longest historical evidence of the impact of public education comes from England. After the imposition of the Educational Act in 1870, which made compulsory public education available to all citizens, schooling rapidly rose to the top of the agenda in England - this action aimed to position the country as a global manufacturing powerhouse (Green, 1990). In the middle of the nineteenth century, the United States made similar effort expanding public education (Edwards & Richey, 1963). Yet both countries maintain significant private education sector. Singapore is probably the most striking example of the country that has prioritized providing free public education to all its residents. Conversely, a higher level of mistrust and conflict was found in nations where public education failed or was poor (Gradstein & Justman, 2000). Kingdon (1996), however, argued that private schools in Northern India were more successful than their public counterparts. Muralidharan and Kremer (2008) agreed with his conclusions that the private school system in India and Pakistan can be a powerful tool for fostering economic growth and reducing poverty and is better for that purpose than public one.

Another aspect of the human capital is the problem of leadership. It is frequent that some individuals exert much more influence on the economy and society than the others. It can be argued that proper leadership treats could be developed through education. Brezis & Crouzet (2006), evaluate the development of employment of leaders and examine the nature of the associations between the recruitment of leaders and economic development. Accordingly, they observe that the chief advantage of western economies was that meritocracy became the foundation for leader’s employment. Though meritocratic assortment should outcome in the best being selected, the study displays that meritocratic employment leads also to class delamination and auto recruitment. The study evaluates the significances of stratification resulting from meritocratic assortment for the nation's growth and displays that it is reliant upon the type of not only educational but also technological variations happening in the nation. Auguste (2018) studied the role of human capital in shaping economic development. The study argued modern human capital is more and more often shaped also by virtual education. To

expand the span of learning opportunities, e-learning also played a vital role in developing economies. However, this technique is not widely accepted and still not utilized in underdeveloped nations. Some researchers claim even that lack of Internet based education seriously handicaps economic growth. For example (Ali et al., 2018) claims that Pakistan due to not utilizing the modern technology and updated learning platforms is already facing a crisis due to lack of knowledgeable human capital. Supporting evidence was provided by analyzing feedback of 354 students at the Virtual University of Pakistan (Khan, 2015). Bennett (2009) stated that the Internet has evolved into a more robust infrastructure for providing online education also in the workplace. It allows people to acquire the specialized information, specialized abilities, and diversified experience necessary to generate original concepts. In the business, people often work together in virtual teams. Moreover, Welsh et al. (2003) analyzed the state of e-learning and concluded that implementing e-learning platforms in businesses will improve business training and soft skills. In addition, trainees are allowed to exercise choice and discretion in their content presentation through this possibility, which may encourage them to develop greater independence. However, the trainer must maintain monitoring to ensure the desired outcomes are reached. Hence, one of the main reasons' students fail to complete their online courses is disinterest (Skipper, 2000).

Summing up the above discussion on the role of education in shaping of the human capital it has to be accepted that education should be considered an important factor in creating human capital and considered a model variable in a study attempting to understand the relation between human capital and economic growth. While it would be desirable to apply as many components of education as possible as measures of its quality (and impact) it seems that conclusive – and more importantly scientifically tested - studies primarily recognize the importance of the education level (primary, secondary, tertiary).

Second frequently quoted in the economic literature component which impacts human capital is the health of the population. It is expected that healthy individuals could contribute significantly more to socio-economic development and will themselves not become a burden for the society. Subeh (2023) demonstrated that education, along with health factors, has a broader impact on economic growth than the connection between education and economic growth individually. The results emphasize the effect of both health and education as an essential part of human capital.

The model developed by Barro (1996) includes factors such as physical capital, working hours, workers' education and health. He demonstrated that reduced spending in the healthcare system reduces people's longevity. From his vantage point, having a healthy workforce and population is essential, and he promotes investing more in healthcare and not only in education to strengthen working conditions. Bloom et al. (2004) used life expectancy as a proxy for health to reveal a statistically significant relationship between economic growth and health. They concluded that for every year, extra life expectancy increases production by 4%.

Other studies looking at how both health and education contributed to human capital could be cited as well - the research (Gyimah-Brempong & Wilson, 2005; Odior, 2011) shows that good health and schooling quality both are essential for people to flourish personally and professionally. Furthermore, Strauss and Thomas (1998) claim that health has a significant role in increasing income alongside schooling. Gyimah-Brempong and Wilson (2005) also examine health indicators as a crucial factor in determining human capital, and they find that a healthy environment accounts for between 22 and 30 per cent of the growth rate. Barro and Sala-i-Martin (2004) employed life expectancy and mortality rates in a regression study, which they found to have a beneficial impact on economic growth. People who care for their health are more likely to have fruitful, long lives. They are better positioned to use their earnings to improve their competence and advance their careers (Liu et al., 2021). Their abilities to make such investments that may pay them off in the long-term increase as their life expectancy increases due to their healthy way of living. A fit individual can better participate in group activities, provide new and original ideas, and take on challenging tasks. In addition, a productive workforce is a sign of a successful organization (Morand & Merriman, 2012)

For the years 1960–2000, Gyimah-Brempong and Wilson (2005) employed the dynamic panel estimator approach to prove the correlation between health and education spending and economic growth across Africa vs the rest of the world. Odior (2011) used an integrated sequential dynamic computable general equilibrium (CGE) model, and he discovered a correlation between GDP growth and health care spending on the part of the government in Nigeria. Using government recurrent and capital spending on education and health Rena et al. (2007) argue that the state of farmers' health is vital to agricultural success in rural Ethiopia. Human capital development was also found to positively affect economic growth in Ethiopia from 1960/61 to 2003/04, as measured by Teshome (2006), who examined government spending on both education and health. Similar investigation, conducted by Tofik (2012) between 1975 and 2010, found no correlation between GDP growth and human health

development. However, the findings did not corroborate or disentangle the effects of health and education on GDP expansion in a consistent manner.

It is not possible to characterize the significance of human capital development without considering both health and education. Thus, many studies have begun to employ health and education as stand-ins for human capital, allowing them to overcome the shortcomings of earlier approaches. The critical decision while developing economic model which incorporates human capital is selection of indicators which will correctly represent those components of human capital.

For instance, both the educational and healthcare systems studied by Benos and Karagiannis (2009), used a wide range of indicators. Enrollment numbers, pupil-teacher ratios, and the number of doctors and hospital beds are all examples of such metrics. On the other hand, Qadri and Waheed (2014) analyzed the GDP rate by using enrollment rates to quantify education and government expenditures on health as only measures. Education and health play a vital role in determining the value of human capital as a connected force thus should be measured by single indicator – is a proposal formulated by Barro et al. (1992). He combined education and health measures in an index to prove the validity of his study and illustrate that both, a person's schooling and health are necessary to achieve a quality of life.

Considering the above variety of approaches this study will try to utilize indicators both representing education and health. Since the cited literature is inconsistent in its finding in regard to the role of different education systems and levels, all three typical education stages will be considered in the subsequent model. Informal education and ad-hoc educational programs will be omitted as it is not possible to provide for consistent and comparable indicators measuring their impact across the studied countries. For measuring health, life expectancy and government expenditure on health provision will be selected. This choice is based on the presumption that expenditure is a measure of how well given economy tries to preserve its human capital, while life expectancy shows how well this has been achieved. Obviously, there are many more factors which impact health than financial ability of the health care system but the same applies to the life expectancy – because many factors other than health might impact it too. Thus, using both measures should provide for balanced picture.

The extant literature established the role of human capital in shaping economic development. These studies offer useful insights regarding the advancement of research work. However, the findings over the human capital – economic growth nexus are often - as per quoted research

results - contradictory and inconclusive. They concentrate on the education and health as meaningful proxies for human capital (which could be measured and substituted for human capital in modelling exercises). Primarily three gaps could be identified in existing literature regarding this topic. First, the previous empirical studies mainly focused on developed and developing countries. An emerging economic regions which consist of mixed development levels (like Balkan Region) were less focused. Second, the application of different statistical techniques, samples, and data has created the challenges for comparing research completed by different scholars. Keeping in view, the above limitation, this research will follow studies that examine human capital and economic growth nexus through statistical techniques such as Driscoll and Kraay(D-K) model, Feasible Generalized Least Square (FGLS) regression and System GMM. Third, this study will consider the data analysis for in-depth understanding of the role of human capital in shaping economic development, by dividing the whole dataset into subsamples based on level of economic development with the help of International Monetary Fund (IMF) classification. According to IMF grouping of countries by income, the four categories are identified: high-income countries, upper-middle-income economies, lower-income countries and lower middle-income markets. Based on the IMF classification, the 33 countries of Europe were divided into high-income and upper-middle-income countries. However, none of the countries in the sample belongs to lower and lower middle-income countries in Europe. Hence, this study considers two groups, 26 countries are high-income countries, whereas the remaining 7 countries are considered middle-income countries. Fourthly, the impacts of economic integration on the human capital vs economic growth relation has not been subjected to comparative studies. This research segregates the whole sample into subsamples based on membership in the European Union in such a way, that 6 countries belong to Non-European Union Balkan, 24 countries are included in European Union, and 10 countries belong to both the European Union and Balkan Region. This disaggregation should provide better insights for policy makers on the nexus between human capital and economic growth in view of the possible (hypothesized) role of the economic integration process on the researched relation.

CHAPTER 3

BALKAN COUNTRIES

3.1 EU and non-EU Balkan Countries

The Balkan Regions' economies include Bulgaria, Croatia, Greece, Romania, Slovenia, Serbia, Turkey, Albania, North Macedonia, Bosnia and Herzegovina, and Montenegro. Among these economies, Bulgaria, Croatia, Greece, Romania, and Slovenia have become part of the European Union (EU). Bulgaria joined the EU on January 1st, 2007. Croatia became a member on July 1st, 2013. Greece joined the EU earliest - on January 1st, 1981. Romania became a member on January 1st, 2007. Slovenia joined the EU on May 1st, 2004. These countries have undergone a process of integration into the EU, adopting EU regulations, policies, and standards, and benefiting from the economic and political advantages of EU membership.

On the other hand, Turkey, Albania, North Macedonia, Bosnia and Herzegovina, and Montenegro are not yet part of the European Union. Out of these countries, Turkey and Albania among many others have expressed their desire to join the EU and has been a candidate for EU membership since 1999. However, the accession process for these economies have faced various challenges and have been ongoing for many years. The decision to join the EU ultimately rests with both the EU member states and the candidate country, and it requires meeting certain criteria and fulfilling the obligations set by the EU.

Regarding the orientation of these countries' policies towards joining the EU, it varies among them. Some of the non-EU countries have been actively working towards EU membership and have made progress in implementing necessary reforms and aligning their policies with EU standards. They have received encouragement and support from the EU through the enlargement process. These countries see EU membership as an opportunity for economic development, stability, and increased cooperation with other EU member states.

For instance, Turkey has expressed a desire to join the EU and has been a candidate country since 1999. The accession process, however, has faced numerous challenges, including political issues, human rights concerns, and differences on key policy areas. Despite the ongoing negotiations, progress towards membership has been slow, leading to discussions and debates about the future of EU-Turkey relations.

Similarly, Albania has been actively pursuing EU membership and has made considerable progress in implementing necessary reforms. The country has shown commitment to aligning its policies and regulations with EU standards. Albania's dedication to the accession process has been acknowledged by the EU, which has provided support and encouragement for its continued efforts.

Likewise, North Macedonia has demonstrated its determination to join the EU by implementing significant reforms and resolving long-standing disputes with neighboring countries. In 2020, the country successfully resolved the name dispute with Greece, which had been a major obstacle to its EU aspirations. This breakthrough paved the way for the opening of EU accession negotiations, signifying a positive step towards future membership.

Following others footsteps, Bosnia and Herzegovina, as a potential candidate, has expressed interest in EU membership. However, the country's complex political structure and governance challenges have hindered progress. Internal divisions and disagreements among ethnic and political groups have made it difficult to implement necessary reforms consistently. Achieving consensus and establishing effective institutions remain key prerequisites for advancing towards EU integration. In addition, Montenegro, after gaining independence from Serbia in 2006, has actively pursued EU membership. The country has made significant strides in implementing reforms, improving the rule of law, and strengthening democratic institutions. Montenegro opened EU accession negotiations in 2012 and has been progressing steadily towards fulfilling the requirements for EU membership.

In a nutshell, Albania, North Macedonia, and Montenegro have clearly demonstrated their policy orientation towards joining the European Union. These countries view EU membership as an opportunity for economic development, political stability, and enhanced cooperation with other EU member states. They have actively embraced EU values, principles, and regulations, investing in reforms to meet the EU's criteria. Turkey, despite its aspirations, has faced challenges in aligning its policies with EU standards. Ongoing political issues and disagreements on certain policy areas have impacted the progress towards EU membership. The country's policy orientation towards the EU remains subject to internal and external dynamics, and its future relationship with the EU remains uncertain.

The economies of the Balkan Region have experienced varying degrees of integration with the European Union. Bulgaria, Croatia, Greece, Romania, and Slovenia have become EU member states, benefiting from the economic and political advantages of EU membership. Turkey,

Albania, North Macedonia, Bulgaria and Bosnia and Herzegovina, and Montenegro continue to pursue EU membership, with varying levels of progress and challenges.

3.2 Economic Growth and Its Factors in Balkan Region

This section presents a comparison of the key economic indicators – variables used in the model developed in chapter 4. This will allow to first observe how raw economic indicators behaved in the Balkan Region vs the European Union and to observe variation in those indicators between countries and country groups. Those economic values will be later used for the relationship assessment. The primary dependent variable representing economic growth is Gross Domestic Product (GDP). The key independent variable is Human Capital, and several control variables such as Financial Development, Industry, International Tourism, ICT Development, and Trade. The first graph (see Figure 1) showcases the relationship between GDP changes for the European Union and Non-European Unio Balkan Region. It demonstrates the higher economic development in European Union vis-à-vis Non-European Union Balkan Region.

The subsequent graphs (see Figures 2-6) depict the relationship between each control variable (Financial Development, Industry, International Tourism, ICT Development, and Trade). Each graph showcases comparison among these variables with respect to the European Union and Non-European Union Balkan Region. Overall, these graphical comparisons provide a visual representation of the relationships between the dependent variable (GDP), independent variable (Human Capital), and the control variables (Financial Development, Industry, International Tourism, ICT Development, and Trade), shedding light on their potential respective impacts on economic growth of European Union and Non-European Union Balkan Region.

Figure 1 shows that the gross domestic product (GDP) of the European Union (EU) has consistently surpassed that of the non-European Union Balkan Region from 2000 to 2020 due to several key factors. Firstly, the EU encompasses a larger market with a higher population, allowing for greater economies of scale and increased trade opportunities. Secondly, the EU benefits from a more developed infrastructure, including transportation networks and technological advancements, which enhances productivity and efficiency. Additionally, the EU's access to established financial systems and investment opportunities attracts foreign capital inflows. Lastly, the EU's political stability and institutional framework foster economic growth and attract foreign direct investment, creating a favorable business environment.

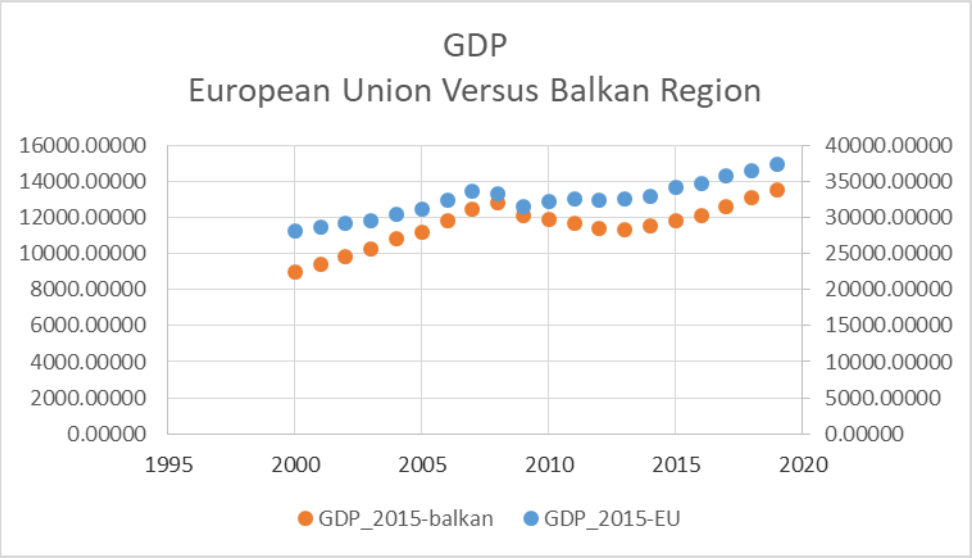

Figure 1 The annual cross-sectional averages of gross domestic product for Non-EU Balkan Region and European Union (EU)

Source: Author's own calculations based on data from WDI & IMF.

Similarly, Figure 2 shows that from 2000 to 2020, the Balkan Region experienced a mixed trajectory in terms of human capital (here represented by composite measure of human capital index) development, with some progress made, albeit at a slower pace compared to the European Union (EU). Several factors contributed to the region's relatively lower human capital development. Firstly, the Balkan countries faced the legacy of political and economic instability, including conflicts and post-communist transitions, which hindered their ability to invest in education, skills training, and research and development. These challenges resulted in limited access to quality education, brain drain, and a lack of innovation-driven economies.

However, despite these obstacles, the Balkan Region made efforts to align with the EU and enhance human capital development. These endeavors were facilitated by the EU's enlargement policies, which encouraged reforms, institution-building, and investment in human resources. The EU integration process prompted the adoption of EU standards, regulations, and best practices, gradually bringing the Balkan countries closer to the EU in terms of human capital development.

Although progress was slower compared to the EU, the Balkan Region demonstrated a commitment to investing in education, vocational training, and entrepreneurship, laying the groundwork for a more skilled and competitive workforce in the future. With continued

alignment and support from the EU, the human capital development gap between the Balkan Region and the EU could further narrow in the coming years.

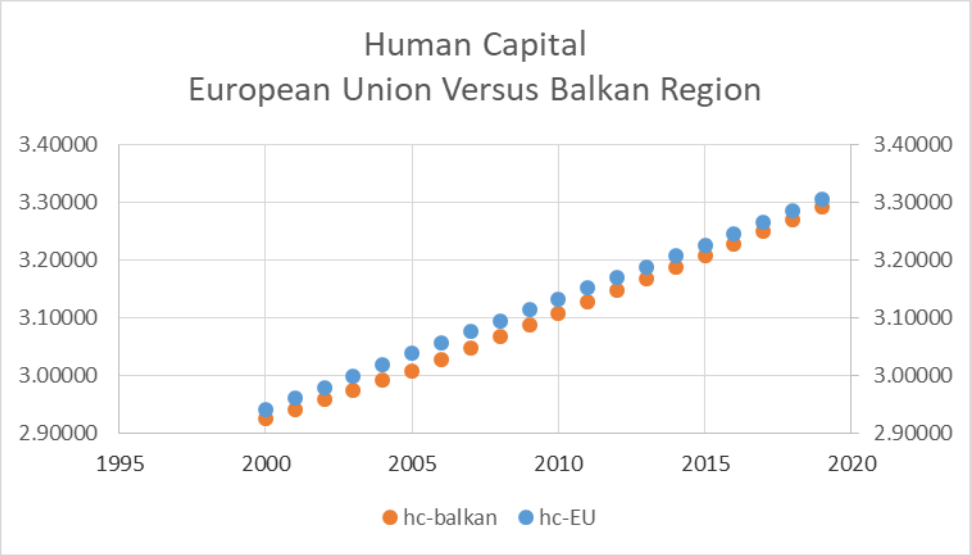

Figure 2 The annual cross-sectional averages of human capital (index) for Non-EU Balkan Region and European Union (EU)

Source: Author's own calculations based on data from WDI & IMF.

Figures 2-6 shows the mean average of human capital proxies, including government expenditure on education, primary education, secondary education, and tertiary education, and reveals a mixed pattern between European Union (EU) economies and the non-European Union Balkan Region from 2000 to 2020. Several factors contribute to this phenomenon. Firstly, EU economies generally have higher levels of economic development and resources, enabling them to allocate more substantial investments in education. Consequently, their mean average of human capital education based proxies tends to be higher than that of the non-EU Balkan Region, which faces greater economic challenges. Secondly, the EU's focus on harmonizing education systems and promoting cooperation among member states has facilitated the sharing of best practices and the implementation of comprehensive education reforms. This has resulted in more standardized and efficient education systems, positively impacting human capital development

Furthermore, historical and cultural differences between EU economies and the non-EU Balkan Region contribute to the mixed pattern. The EU has a longer history of investment in education and a stronger tradition of valuing human capital. In contrast, the non-EU Balkan Region has undergone significant political and economic changes, leading to disparities in education quality and outcomes. Overall, the mixed pattern observed in the mean average of human capital

proxies between EU economies and the non-EU Balkan Region from 2000 to 2020 can be attributed to variations in economic development, resource allocation, education reform efforts, and historical factors. Addressing these disparities requires sustained efforts to strengthen education systems, increase investment, and promote regional cooperation in the Balkan Region.

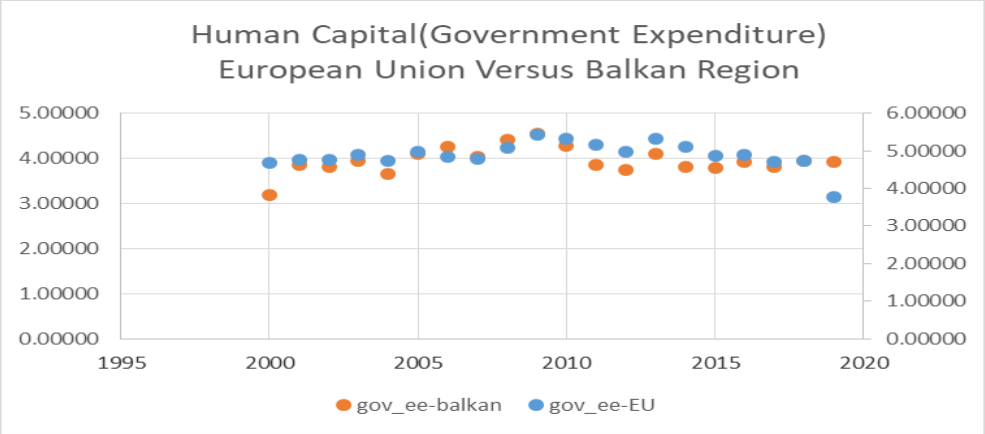

Figure 3 The annual cross-sectional averages of Government Expenditure for Non-EU Balkan region and European Union (EU)

Source: Author's own calculations based on data from WDI & IMF.

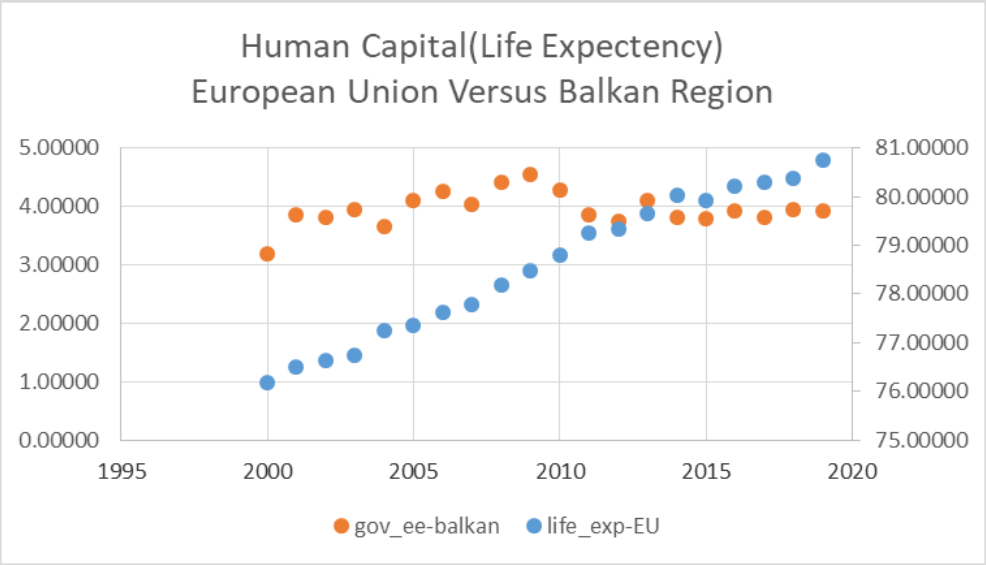

Figure 4 The annual cross-sectional averages of Life Expectancy for Non-EU Balkan Region and European Union (EU)

Source: Author's own calculations based on data from WDI & IMF.

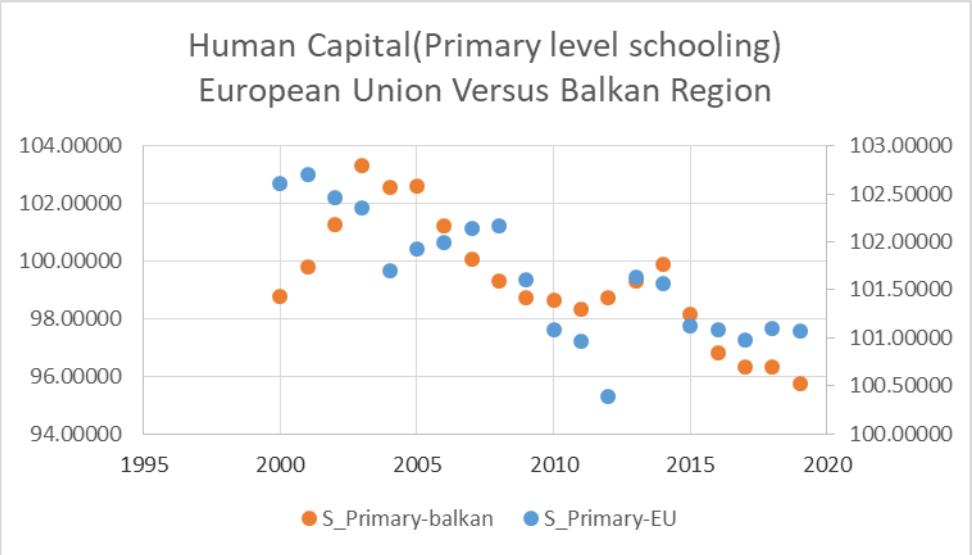

Figure 5 The annual cross-sectional averages of Primary Schooling for Non-EU Balkan Region and European Union (EU)

Source: Author's own calculations based on data from WDI & IMF.

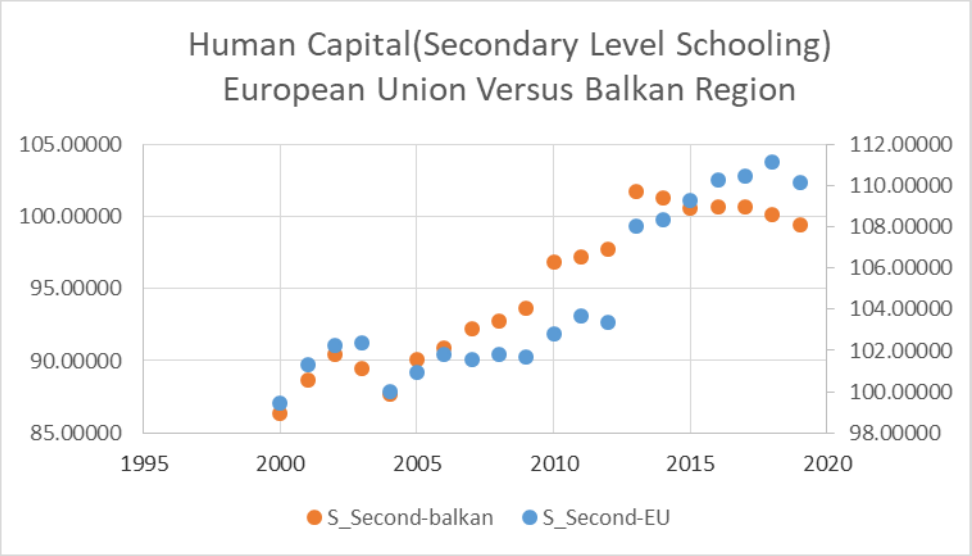

Figure 6 The annual cross-sectional averages of Secondary Schooling for Non-EU Balkan Region and European Union (EU)

Source: Author's own calculations based on data from WDI & IMF.

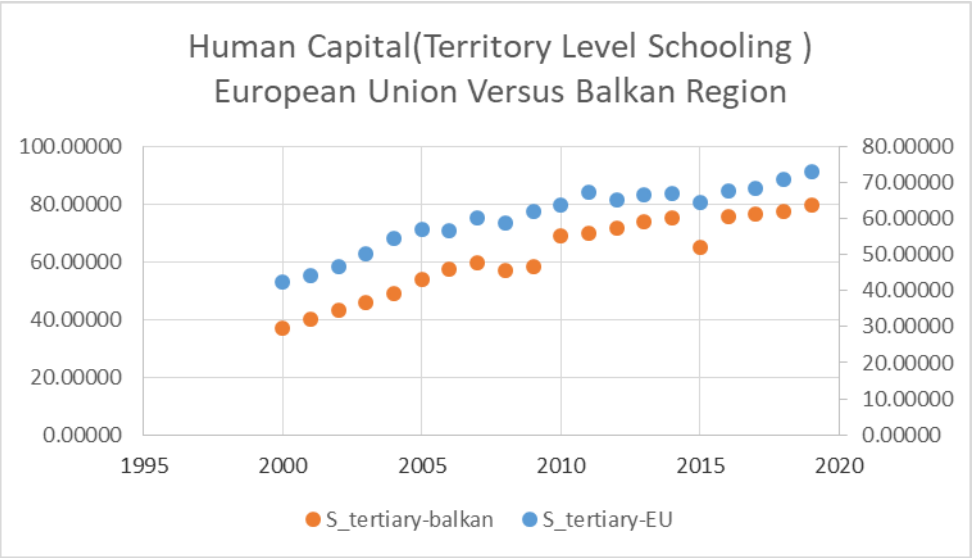

Figure 7 The annual cross-sectional averages of Territory Schooling for Non-EU Balkan Region and European Union (EU).

Source: Author's own calculations based on data from WDI & IMF.

Figure 8 shows that the mean average of financial development in the European Union surpasses that of the non-European Union Balkan Region for several reasons. Firstly, EU member states benefit from an established economic framework, including harmonized regulations and policies that foster stability and investment.

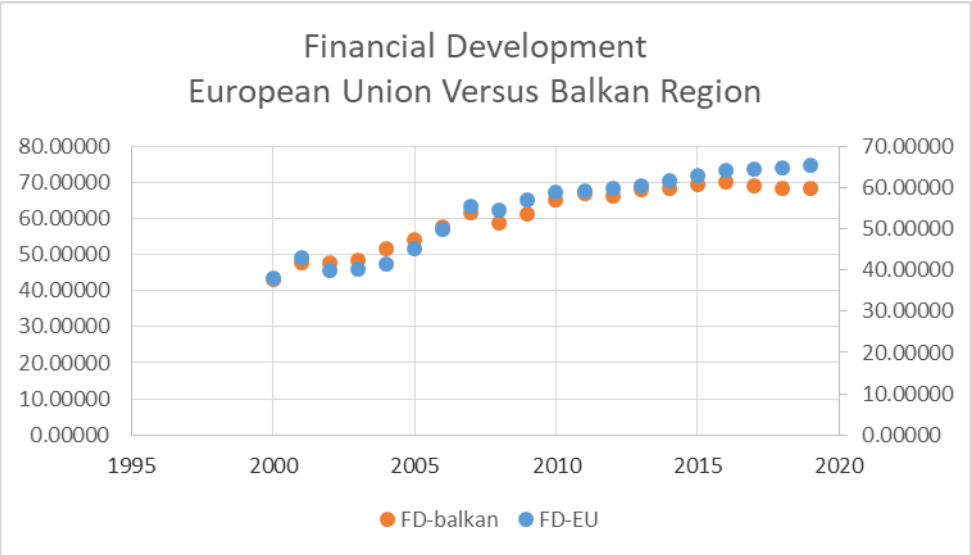

Figure 8. The annual cross-sectional averages of Financial Development for Non-EU Balkan Region and European Union (EU)

Source: Author's own calculations based on data from WDI & IMF.

This facilitates access to capital markets, encourages foreign direct investment, and promotes economic growth. Additionally, the EU's integration allows for greater financial integration, facilitating cross-border transactions and trade. Moreover, EU membership grants access to EU funding programs, which stimulate infrastructure development and innovation. Lastly, the EU's larger market size and diverse economies contribute to enhanced financial opportunities and resilience, further differentiating it from the Balkan Region.

Figures 9-10 below show that during the period of 2000-2020, the mean average of industrial development and international tourism in the European Union has become closer to the mean values of the non-European Union Balkan Region for several reasons. Firstly, the EU's integration policies and economic support have fostered industrial growth and promoted tourism in the Balkan countries. This has resulted in increased investment, infrastructure development, and the diversification of tourism offerings. Secondly, the EU's open borders and visa liberalization agreements have facilitated travel and boosted tourism flows between the EU and the Balkans. Moreover, the EU's marketing campaigns and collaborations have raised the region's profile, attracting more international visitors. These factors have contributed to the convergence of industrial development and international tourism between the EU and the non-EU Balkan Region.

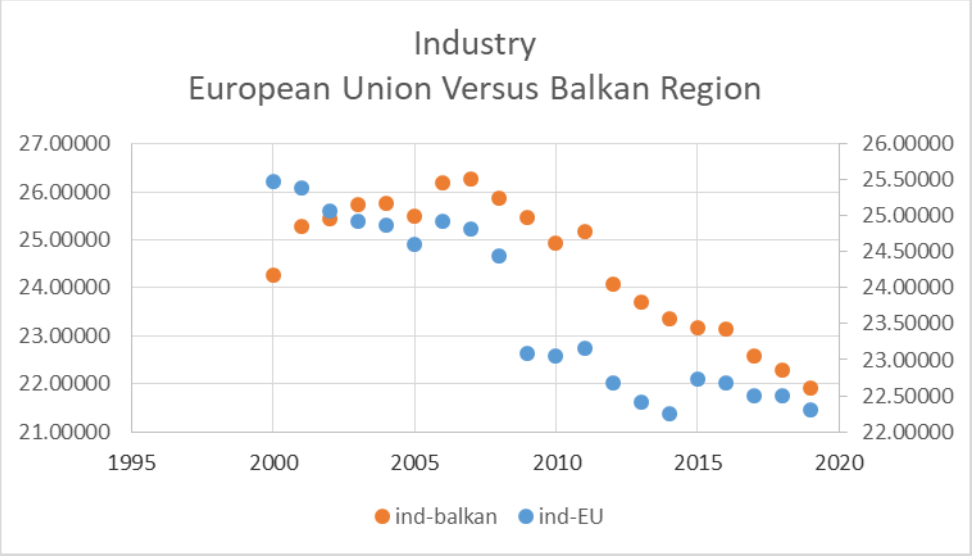

Figure 9. The annual cross-sectional averages of Industry for Non-EU Balkan Region and European Union (EU)

Source: Author's own calculations based on data from WDI & IMF.

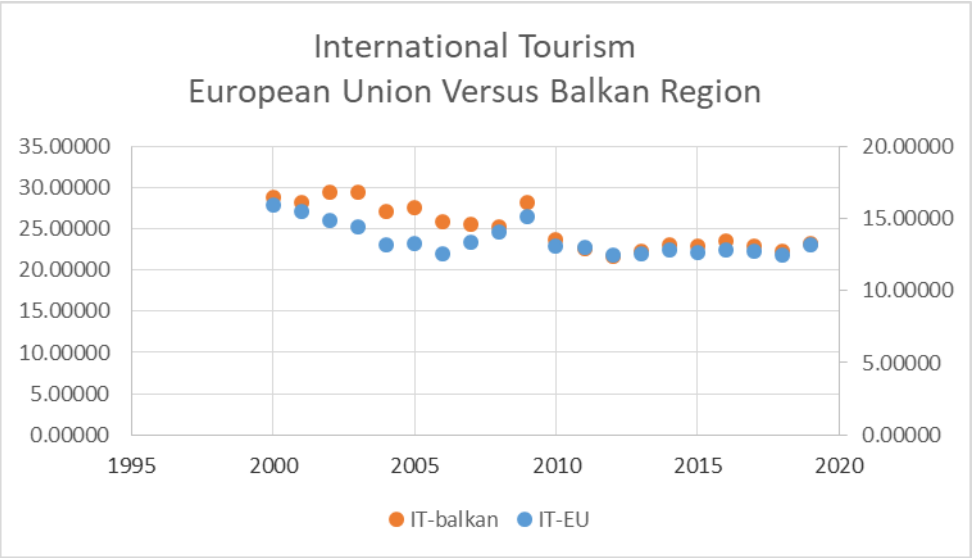

Figure 10 The annual cross-sectional averages of International Tourism for Non-EU Balkan Region and European Union (EU)

Source: Author's own calculations based on data from WDI & IMF.

Figures 11-12 show that from 2000 to 2020, the mean average of ICT-related development and trade in the European Union exceeded the mean values of the non-European Union Balkan Region due to several factors.

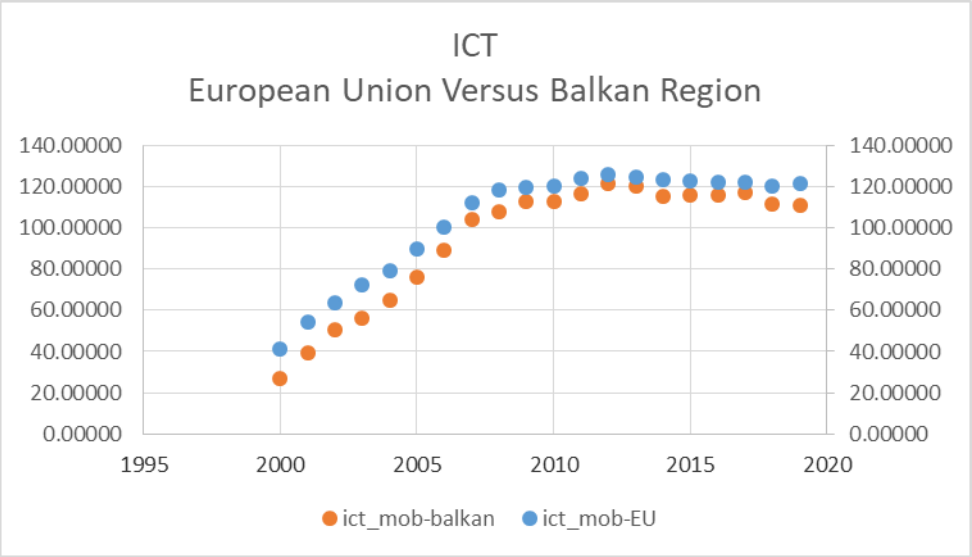

Figure 11 The annual cross-sectional averages of ICT for Non-EU Balkan Region and European Union (EU)

Source: Author's own calculations based on data from WDI & IMF.

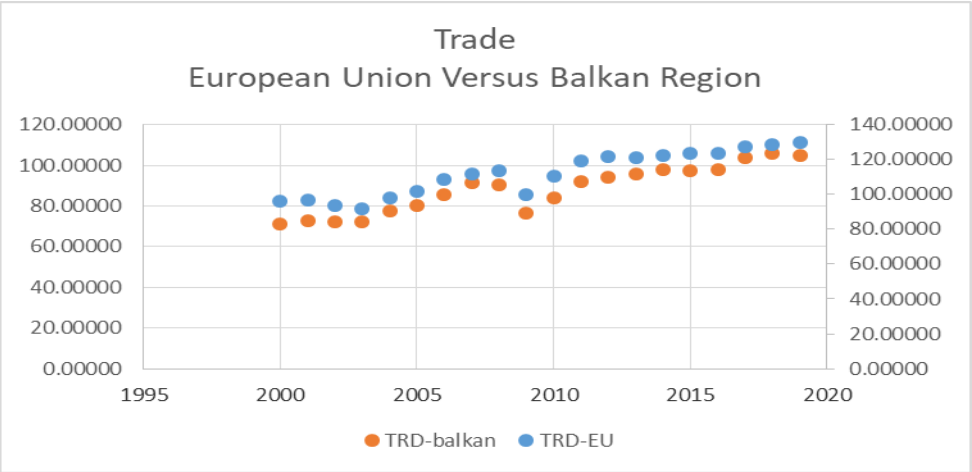

Figure 12 The annual cross-sectional averages of Trade for Non-EU Balkan Region and European Union (EU)

Source: Author's own calculations based on data from WDI & IMF.

Firstly, EU member states have benefitted from significant investments in ICT infrastructure, research, and innovation, fostering technological advancements and digital transformation. This has propelled the growth of the ICT sector and enhanced trade in digital goods and services. Secondly, the EU's harmonized regulations and policies have facilitated cross-border ICT trade and enabled the development of a single digital market. Additionally, the EU's larger market size and established business networks have attracted multinational ICT companies and increased investment flows. These factors have contributed to the EU's superior performance in ICT-related development and trade compared to the non-EU Balkan Region during the given period.

CHAPTER 4

MODEL AND DATA ANALYSIS

4.1. Conceptual Model and the Operationalization of Model Variables

The research considers economic growth as the dependent variable and human capital as an explanatory variable. Furthermore, the financial development, industry, international tourism, ICT, and trade are considered as control variables.

Statistical techniques were applied to investigate the effect of human capital on economic development. The explained variable in this model is economic development. This approach follows Sultanuzzaman et al.(2019) and considers the widely used GDP per capita as a measure of economic growth (Ahmed, 2021).

Since there is no unanimity on the characteristics that make educated workers useful, cross-comparison and robustness checks were applied (Siddiqui & Rehman, 2017) to examine the different measures of education. To this end, human capital index, government spending on education, life expectancy (proxy for health), and education enrollment ratios such as primary schooling, secondary schooling, and tertiary schooling are employed (Keji, 2021; Wang & Bramwell, 2012).

Human capital is an independent variable used in this study, following Opoku et al. (2022). This study and several others measured human capital through the indicators. The commonly used ones are composite index of human capital (for instance as reported by IMF). However it is established in more recent literature that several factors which shape human capital should be rather considered separately than as an index due to variability of their impacts (Feenstra et al., 2015). Simply putting them in one composite index might be a mistake because of those differences (and sometimes contradictory effects) as the previous discussion in chapter 2 shows. Those include especially government expenditure on education and primary, secondary, tertiary education development as well as health of the population. Furthermore, this set of human capital proxies is further justified by literature pointing out that people with healthier lifestyles and increased levels of education would have a heightened awareness of the need to conserve the natural world and would work to do so (Ahmed, 2021), as a result it is also expected that

human development will have a favorable impact not only on economic development as such but also will ensure sustainability of that economic progress (M. Ali et al., 2018). This is important in view of the evolution of the economic growth concept and paradigm shift from the production output towards sustainable production output. But health indicator in itself is important determinant of human capital. As suggested by Sultana et al. (2022), life expectancy estimation could be a good proxy used to measure health. Better health and fewer fatalities contribute to a longer life expectancy, which further contribute to economic growth (Abbas et al., 2020). As mentioned above, this study also considers government expenditure on education as a proxy for human capital development for data analysis purposes (Fahimi et al., 2018). Similarly, to understand the role of human capital in shaping economic development, the value and applicability of education needs to be analyzed. Thus, school enrollment ratios serve as three measures (primary level, secondary level, and tertiary level) and are employed in this study as additional proxies of human capital (following M. Ali et al., 2018; Cheng et al., 2022).

There are obviously other factors which contribute to economic growth apart of the human capital. Modern economic development theories pin-point some of them as discussed in chapter 2.1. Therefore, this study considers also control variables such as financial development (Sanaphanh & Sethapramote, 2022), industry (Ha, 2022), international tourism (Polemis & Oikonomou, 2022), ICT, and trade (Hunjra et al., 2022; Le et al., 2019a). Furthermore, the detailed measurement of all the variables is reported in Table 1. This set of control variables helps to better examine the role of education against other significant factors that contribute to modern economic growth (Razzaq et al., 2013). While the selection of factors in any economic growth models is a subject of fierce discussions in the economic community, the reason for considering financial development, industry, international tourism, ICT, and trade as control variables is because several recent empirical studies have advocated the substantial contribution of variables as mentioned above in shaping sustainable economic development (see especially Mehmood, 2022). The complete conceptual framework is presented via Figure 13 for better readability.

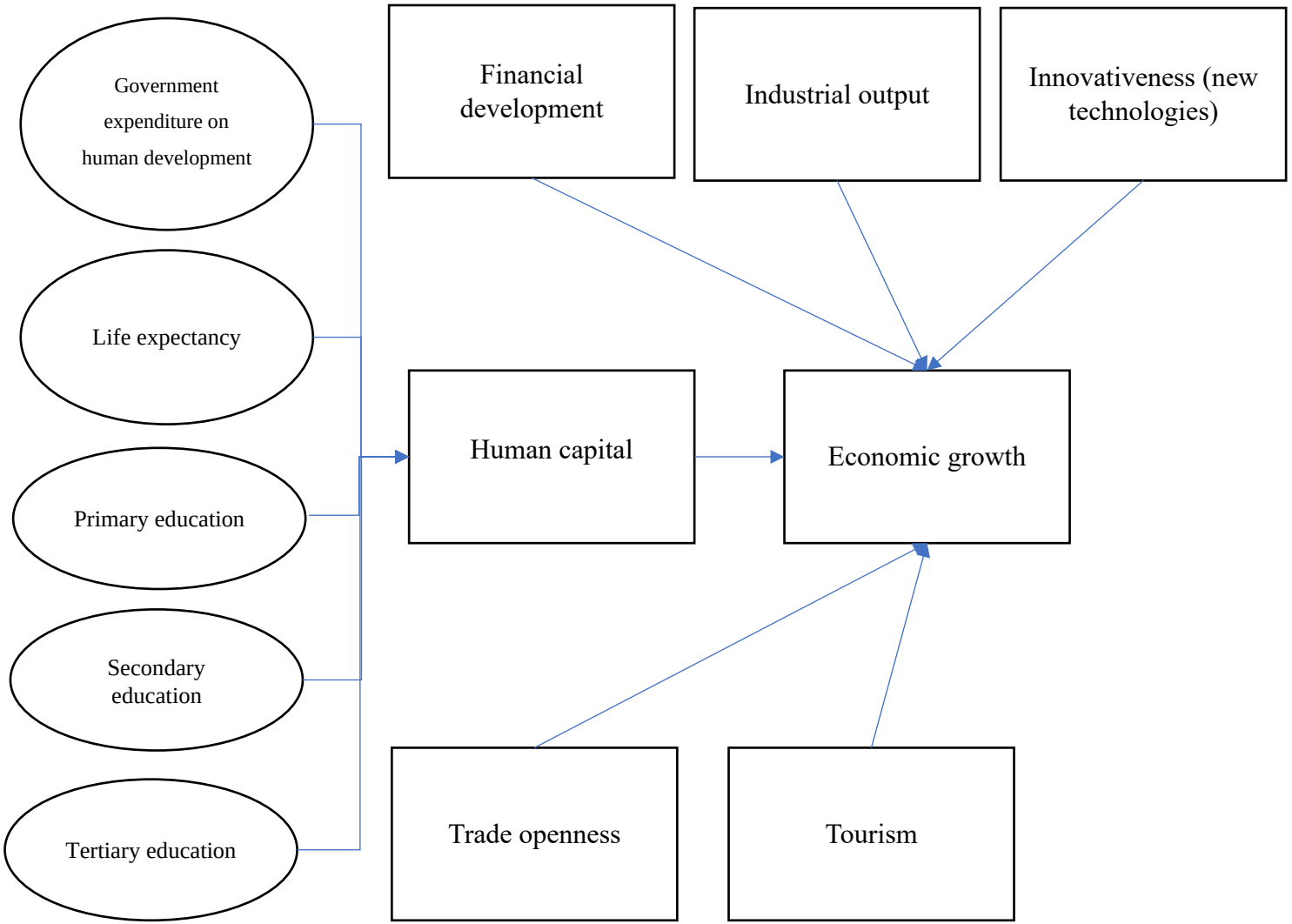

Figure 13: Conceptual Framework

Source: Author's work

4.2. Sample Details

This study considerers 33 European countries from 2000 to 2019 as a sample to establish the link between human capital and economic development. The sample consist of 27 European Union (EU) economies and 6 countries of the Balkan Region which are not in the EU. Hence, 33 countries are used as selected countries for data analysis. This research considers the European region as a basis for the research sample for the following reasons (i) Europe is diverse and there are developed and developing countries within the region; (ii) Europe and developing countries in Europe are currently embarking on a transformative path, shaping a new trajectory for human capital development mainly due to the socio-political ramifications of the existence of the European Union and enlargement processes. This is especially important due to the fact that certain legal, organizational and economic unity had to be achieved for the new countries to be admitted. It means that while there are still differences in economic development certain legal and institutional frameworks are largely unified – making the region perfect test bed for separating some of the factors which impact development while many others are already equalized; (iii) Developing European countries are recently facing educational, economic, and political instability, whereas, the developed EU countries have already addressed many of those challenges during economic growth over the last decades. In this context, it becomes vital to look at different European areas to identify the long-term contribution of human capital to economic success—notably, the need to emphasize potential barriers and solutions to the human capital building in developing countries.

This study segregates the whole European region into different sub-regions for the following reasons. (i) Human capital plays a significant role in the development of an economy and leads toward growth sustainability in the long run (Hanushek & Woessmann, 2015). However, there is a crucial need to analyze human capital's importance and structure. Specifically, policymakers should take a broader insight by integrating the role of human capital with economic development. Therefore, effective growth policies that need to consider underlying long-term evolutions would be implemented. The underlying demand for skilled labor market at the regional level creates an obvious circumstance, presenting a resolution for regional growth variations (Gennaioli et al., 2013). (ii) Furthermore, economic growth is inextricably linked to geographical diversification. Therefore, Nobel laureate Paul Krugman advised countries to focus more on domestic difficulties to strengthen their external trading system (Krugman, 1991). Following the same perspective, EU policy notifies the formulation and execution of

regional level policies as fundamental pillars for sustainable economic growth in modern world. Therefore, the EU strives to focus on these issues to upgrade regional economic productivity. A survey report ordered by the European Commission, revealed that economic productivity in the EU recorded almost 50% of its production from only 14% of its region (European Commission, 2008). (iii) GDP per capita from various regions of the EU was also recorded with significant differences. As a result, it is necessary to examine the outcomes across various regions because aggregate results at the national level in Europe often portray an opposing scenarios. Furthermore, rising financial concerns (as happened around 2008 or 2022) broaden the variance of regional development in Europe. Thus, and taking into consideration existence of certain blocks within EU, the research debate in European countries should shift from the strictly national to the regional level. Regional observations also provide a larger perspective for clearly analyzing the facts. (iv) Another characteristic of regions that distinguishes them from others is their custom, language, and cultural identity. So far there has been little discussion in the literature on the culture- GDP-human capital link from the regional perspective and more emphasis has been placed on the national-level output ratios. While Balkan countries are diverse, they could be still considered as an entity in which many religious and historically political influences clashed forming a kind of uneasy consensus of co-existence. Interestingly Balkan Region is split between EU and non-EU membership to a large extent based on those historical contexts. It could be interesting to observe if there are any differences (or lack of them) in regard to those sub-regions utilization of human capital for fostering economic development.

Considering the above discussion, this research segregated the selected 33 countries into different geographical regions like European Union countries, and European Union Balkan Region and Non-Europe Union Balkan Region. This allows to focus on the Balkan Region as a main research theme at the same time helps to understand how (and if) EU membership is of importance to the research of the human capital – GDP phenomenon. Given the breadth of this issue, the current research focuses on the regional dimension of economic and human capital in Europe and its lessons for economic policy to provide better insights to policymakers.

To understand the variation across the level of development, this study also considers International Monetary Fund's classification to make a different country groups based on income. Application of the IMF classification divides the potential sample into 4 groups: high-income countries, upper-middle-income economies, lower-income countries and lower middle-income markets. However, none of the countries in the European sample belong to lower and

lower middle-income countries. Hence, this study considers two sub-groups differentiated by income: 26 countries belonging to the high-income countries' category, with the remaining 6 considered middle-income countries.

There are several reasons the data has been segregated into different groups based on IMF classification. (i) the extant literature supports the claim that high-income nations, as well as low-income countries, both need to organize their human capital to develop their economy considering possible differences in strength of impactful factors (Sultana, Dey, & Tareque, 2022). Specifically, the previous literature established that human capital based on health-related proxies has a more significant influence over economic growth in developing (lower income) economies because most developing countries are enjoying demographic advantages. Furthermore, health and skill development programs expand affluent opportunities in these countries (Hanushek, 2013). Therefore, developing countries should take the initiative to invest more in their workforce and build up their quality of life. Additionally, economic prosperity for developing nations is only possible by improving their educational level. (ii) Government spending on health contributes considerably and positively to economic growth. In contrast, developed countries have shown (in the body of existing literature) a detrimental impact of life expectancy on economic development. In this perspective, the study emphasizes that education and health are essential qualitative determinants in measuring human capital. Hence, these parameters have a greater impact on economic productivity in developing than in developed countries. Hence, it could be concluded that the impact of human capital varies across level of economic development. The current research revisits the issue of the impact that human capital has in developed and developing economies might be different in order to provide better insights to policy makers. The complete details related to full sample and subsamples are provided in the Appendix.

4.3. Data Analysis Techniques

This study uses panel data framework to analyze the role of human capital and its impact on economic development. It could be argued that panel regression estimation provides many advantages in analyzing such datasets (Hsiao, 2022). First, the study has the option of employing a penal estimate to account for unobserved variation. Secondly, when a large quantity of data is processed, the possibility of making errors is reduced. Thirdly, the use of panel data provides a partial solution to the problem of collinearity between the explanatory variables.

$$y_{it} = \alpha_i z_i + \alpha_{it} x_{it} + \varepsilon_{it} \ldots (i)$$

As per equation 1, economic growth is a dependent variable represented by $Y_i t$ of country i and time t. X_{it} is an explanatory variable. Constant of regression line is denoted with Z_i and affected with all observed and unobserved variables. Following equation 2 is formed to understand the link between human capital and economic development.

$$gdpc_{i,t} = \delta_0 + \delta_{i,t} HC_{i,t} + \sum_{t=1}^{t=n} \delta_{i,t} Controls_{i,t} + \varepsilon_{i,t} (ii)$$

Where,$gdpc_{i,t}$ stands for the log of gross domestic product per capita, $HC_{i,t}$ represents the human capital. To represent human capital the measures representing directly human capital (e.g. human capital index) or indirectly (e.g. government spending on education, life expectancy) could be used (Wang et al., 2018) .Whereas, control variables include financial development, industry, international tourism, ICT and trade. The study (Ogundari & Awokuse, 2018) considers the three proxies related to level of education for the measurement of human capital and investigate the human capital and economic development nexus with the help of the following equation (equation3), which will also be adapted for the current study.

$$gdpc_{i,t} = \delta_0 + \delta_{i,t} EDU_{i,t} + \sum_{t=1}^{t=n} \delta_{i,t} Controls_{i,t} + \varepsilon_{i,t} (iii)$$

Where,$lngdpc_{i,t}$ stands for the log of gross domestic product per capita, $EDU_{i,t}$ represents the education level of enrollment. The current research uses 3 proxies such as primary schooling, secondary schooling and tertiary schooling for the measurement of education based human capital. Whereas, the control variables include financial development, industry, international tourism, ICT and trade.

The extant literature supports the role of these control variables in shaping economic growth as was detailed in chapter 2. Summing up that previous discussion, firstly, financial development is an important factor in economic growth as it provides a source of financing for investment and facilitates the allocation of resources. Therefore, controlling for financial development in the analysis can help to isolate the impact of human capital on economic growth. Secondly, the industrial sector is a significant contributor to economic growth and may affect the relationship between human capital and economic growth. Thirdly, international tourism can have a significant impact on economic growth as it generates foreign exchange earnings and creates employment opportunities. By controlling for international tourism, the extent to which human

capital contributes to economic growth independently of tourism could be recognized. It is especially important considering that subject of the study are Balkan countries many of which depend heavily on tourism in their GDP creation. Fourthly, information and communication technologies (ICT) have revolutionized the way businesses operate and communicate with each other, leading to increased productivity and efficiency and could be considered a good representation of easiness of technology adoption in business (Hussain et al., 2023). Therefore, controlling for ICT can help to isolate the impact of human capital on economic growth, independent of technological advancements. Finally, trade is an important driver of economic growth as it creates opportunities for businesses to expand and access new markets. By controlling for trade, one can determine the extent to which human capital contributes to economic growth independently of external influences (Renzhi and Baek, 2020; Hunjra et al., 2022). The detailed description of dependent, independent and control variables are reported in Table 1.

Table 1 Model Variables

S. No	Variable	Symbol	Measurement
	Economic Growth (Dependent Variable)		
1	Economic Growth	EG	GDP per capita (constant 2010 US$)
	Human Capital (Independent Variable)		
2	Human Capital Index (Proxy 1)	HC	It constructed via three dimensions healthy life, access to knowledge & standard living
3	Govt Expenditure on Education (Proxy 2)	Gov_EE	Government expenditure on education, total (% of GDP)
4	Life Expectency (Proxy 3)	LIFE_EXP	Life expectancy at birth
5	School_Primary (Proxy 4)	S_PRIMARY	Ratio of total enrolment, regardless of age, to the population in the age group that officially corresponds to the primary level
6	School_Secondar(Proxy 5)	S_SECONDARY	Ratio of total enrolment, regardless of age, to the population in the age group that officially corresponds to the secondary level
7	School_Tertiary(Proxy 6)	S_TERITIARY	Ratio of total enrolment, regardless of age, to the population in the age group that officially corresponds to the tertiary level
	Control Variables		
8	Financial Development	FD	Broad money (% of GDP)
9	Industry	IND	Industry (including construction), value added (% of GDP)
10	International Tourism	ITOUR	International tourism, receipts (% of total exports)
11	Information, Communcation and Tech	ICT	Mobile subscribers (per 100 people)
12	Trade	TRD	Trade (% of GDP)

Source: Author's own.

The testing is an essential step in any econometric analysis to determine the validity and reliability of the results obtained from statistical models. This study outlines stepwise testing framework for econometric models like fixed effect, random effect, Hausman test, and dynamic models and later reverts to a robustness check. Static and dynamic panel estimation models are useful for analyzing panel data, which is data that involves multiple observations of the same individuals, firms, or other entities over time. These models are used to estimate the relationships between variables, taking into account both the cross-sectional and time-series dimensions of the data. From the modelling standpoint this study provides also the statistical justification of using Driscoll-Kraay standard errors and feasible generalized least squares (FGLS) for addressing the potential violation of regression assumptions like presence of non-normality, heteroscedasticity, auto serial correlation. Finally, this study uses also the System Generalized Method of Moments (GMM) estimator for data analysis. System GMM is a panel data estimation technique that is useful for addressing issues of endogeneity, measurement error, and omitted variable bias. It allows for the estimation of dynamic models that incorporate both time-series and cross-sectional information.

The OLS, random effect (RE), and fixed effect (FE) models are commonly used in panel data analysis. OLS is the simplest and most commonly used method in econometrics to estimate parameters in a linear regression model. RE model allows for individual-specific time-invariant unobserved heterogeneity and assumes that the unobserved heterogeneity is uncorrelated with the independent variables (Gujrati, 2009). Therefore, when testing the random effect model, the primary concern is whether the assumption of homogeneity of the effects is valid. In contrast to the random effect model, FE model allows for individual-specific time-invariant unobserved heterogeneity and eliminates the unobserved heterogeneity by taking the first difference of the data (Hussain et al., 2022).

The Hausman test can also be used to test the validity of the random effect model compared to the fixed effect model. The Hausman test is a statistical test used to determine whether the fixed or random effect model is appropriate for a given dataset. The test is based on the assumption that the random effect model is efficient but potentially biased, while the fixed effect model is unbiased but inefficient. The Hausman test compares the estimated parameters of both models and determines whether the difference is statistically significant. The null hypothesis supports random effect and alternate hypothesis suggest the fixed effect model. If the p value is less than 0.05 then the fixed effect is more preferable and if the p value is greater than 0.05 then random effect is more suitable (Gujrati, 2009). OLS RE, and FE models are the natural first steps of

data analysis because they are simple and easy to implement. OLS is the most straightforward and easy to interpret technique, while RE and FE models allow for the analysis of time-invariant unobserved heterogeneity. These estimation techniques provide a baseline for comparison and help to identify potential issues with the data.

It is important to present all three data analysis approaches as preliminary action even if only one of them can naturally be applied later because it provides a basis for comparison and helps to assess the robustness of the results. Additionally, presenting multiple models initially helps to address potential violation of regression assumptions in the data. The data analysis based on static models is often plagued with biased and non-consistent parameters in case the regression assumption like independence or identical distribution of errors are violated. For panel data errors may be correlated over time or across individuals. Likewise, the static models are not suitable to test a relationship in presence of endogeneity, and unobserved heterogeneity and simultaneity. Hence, it is important to test the assumptions of these models and consider alternative models if the assumptions are violated.

Keeping in view the limitation of static models, this research applied diagnostic tests like Modified Wald and Wooldridge Test for heteroscedasticity and auto serial correlation respectively, and Jarque–Bera test help to identify issues with the data that may lead to biased or inconsistent estimates. In addition, tests such as Pesaran (2004) CD test is applied to check the issue of cross-sectional dependence. For example, if Modified Wald and Wooldridge test indicate the presence of heteroskedasticity and auto serial correlation, then the RE model may be inappropriate. Similarly, if the Jarque–Bera test indicates that the errors are not normally distributed and CD test indicates the presence of cross-sectional dependence, then OLS and FE models may be inappropriate. These tests help to identify potential issues with the data and guide the selection of appropriate models used for final calculations (Le et al. , 2020; Gujrati, 2009).

The static models assume that the errors are uncorrelated and homoscedastic, which is unrealistic in many cases, particularly in panel data. In order to address this issue, heteroscedasticity and autocorrelation-consistent standard errors can be used, such as the Driscoll-Kraay standard errors. These standard errors allow for the estimation of standard errors that are robust to heteroscedasticity and serial correlation in the error term, and thus are particularly useful in panel data analysis where these issues are common.

The extant literature supports the notion that Driscoll-Kraay Model is widely used by other researchers, as the model producing unbiased and consistent regression coefficients even in the presence of heteroscedasticity and serial correlation in residuals (Le et al,2019; Hussain et al, 2023). Similarly, the panel data analysis based on FGLS allows to relax the basic regression assumptions like homoscedasticity and independence across countries and time and produces consistent regression parameters. Finally, the pervious literature supports the notion that the issue of endogeneity can be curtailed via dynamic panel estimation models like difference GMM and System GMM. In addition, the dynamic panel models also address the unobserved heterogeneity and simultaneity bias in dynamic panel data analysis (Blundell and Bond, 1998; Arellano & Bond, 1991).

In summary, the use of Driscoll-Kraay standard errors, FGLS, and System GMM in dynamic panel estimation- which is a case of this research - is justified because they provide robust and efficient estimators that allow for the relaxation of assumptions made in simpler models like OLS, random effects, and fixed effects models. These methods are particularly useful in panel data analysis where the assumptions of homoscedasticity and independence of errors across time periods and across individuals are often violated. They provide researchers with more accurate and reliable estimates of the parameters of interest, and are widely used in empirical applications of panel data analysis (Le et al. , 2019;Le et al. , 2020; Renzhi and Baek, 2020)

Keeping in view the above discussion, this study executes the data analysis in 5 steps. In the first step, this study estimates the descriptive statistics in order to identify the characteristics data. In second, the study applies static models such as OLS, random and fixed effect to examine the role of human capital in shaping economic development and applies Hausman test to select the best suitable models for data analysis. The study presents results of all three models such as OLS, random and fixed effect models to obtain a better insight of the relationship. Regarding static models' analysis it can be however concluded that they are insufficient to deal with the main objective of the thesis – capturing the effects of education on economic growth, mainly due to the data problems. Specifically, it has been observed the data was plagued with several issues, which violate the basic regression assumptions. For instance, the results of Jarque–Bera test reveals the residuals have non-normal distribution. Whereas, the Wooldridge Test and Modified Wald tests reveal the problems of heteroscedasticity and auto serial correlation. Similarly, the test proposed by Pesaran (2004) indicates the presence of cross-sectional dependence. Hence, keeping in view violation of regression assumptions, the regression

coefficients based on static models are biased and inconsistent. Thus, the decision to use alternative estimation techniques has been made.

The third step in this study is application of Driscoll-Kraay thereby keeping in line the violation of regression assumptions. The D-K is widely used for panel data estimation to control the issues of heteroscedasticity and serial correlation in the error term, and cross-sectional dependency, and produce consistent and efficient regression parameters. As a consequence, in the 4^{th} step, the study uses another approach such as FGLS, which is more powerful and produce consistent and non-biased results even in the presence of heteroscedasticity and serial correlation. Finally, this study tested the impact of human capital on economic development in dynamic panel estimation models to curtail the problem of endogeneity and validate the main empirical findings.

CHAPTER 5

RESULTS

5.1. Descriptive Statistics

The descriptive statistics of the full sample and subsamples are presented in Table 2. The economic growth has a mean value of 9,758; which is greater than the mean reported values of Hunjra et al. (2022) and Renzhi and Baek (2020), suggesting that the selected European countries have, on average greater economic progress than world's average. Further, the difference between mean values is attributed to the difference in the sample size of both studies. The human capital has a mean value of 3,122; which is lower than the reported mean value of Opoku et al.(2022), suggesting that the selected countries have lower human capital than other regions. Further, the human capital proxies based on education, such as primary, secondary, and territory school enrollment, have greater mean values than those reported for other regions by Ogundari and Awokuse (2018).

The mean values of human capital proxies such as human capital index, government expenditure on education and life expectancy are higher in high income European countries, followed by European Union, whereas the lowest mean values of human capital's proxies are reported in the Non-European Union Balkan Region as per Table 2 (B-D), suggesting that more wealthy (higher income) countries also could be characterized by higher values of government expenditure on education, and life expectancy as compared to other states. This can be attributed to the fact that high-income European countries have a well-established and well-functioning education system, which invests significantly in the development of human capital. Moreover, these countries have a robust healthcare system that ensures access to quality health services and contributes to higher life expectancy rates.

On the other hand, the Non-Europe Union Balkan Region has the lowest mean values of human capital proxies, which can be attributed to several factors. One of the primary reasons is the lack of investment in education and healthcare by the governments in the region. Due to the limited resources, these countries may not have the necessary funds to invest in these areas, which leads to a weaker human capital base. Additionally, political instability and conflict in

the region may have a negative impact on the development of human capital as well. Overall, the descriptive statistics provide important insights into the state of human capital in different regions of Europe. The higher mean values of human capital proxies in high-income European countries demonstrate the importance of investing in education and healthcare for the development of human capital, which, in turn, contributes to higher economic growth and development. The lower mean values in the Non-European Union Balkan Region underscore the need for increased investment in education and healthcare in the region to improve the human capital base and promote economic development.

Similarly, Table 2 reveals that the mean values of human capital proxies such as primary schooling, secondary schooling and tertiary schooling are higher in high income European countries, whereas the lowest mean values of aforementioned proxies are reported in the Non-European Union Balkan Region.

Table 2 Descriptive statistics of full sample and subsamples

	GDP	HC	Gov_EE	Life_Exp	SPrimary	SSecond.	Stertiary	FD	ind	IT	ICT	TRD
Panel A. Full Sample												
Mean	9.758	3.212	4.219	77.61	99.651	104.372	60.43	54.38	23.694	13.518	104.075	111.901
STDV.	0.911105	0.880258	0.409703	0.153291	0.824841336	0.648767	0.14062	0.980532	0.409838	0.261035	0.458748	0.847437
Min	7.581	2.941	4.767	70.005	100.532	99.00	42	38	22	12.477	41	91
Max	11.333	3.305	5.418	83.832	102.534	110	72	66	23	15.969	125	127
Obs	660	660	660	660	660	660	660	660	660	660	660	660
Panel B. EU												
Mean	10.195	3.3122	4.49	78.566	100.5690737	104.537	60.44	54.7	23.494	14.842	106.075	109.901
Std. Dev.	0.769293	0.51397	0.72651	0.907955	0.173738141	0.295009	0.42384	0.267023	0.516552	0.895631	0.528332	0.500832
Min	8.768	2.147	4.343	70.259	100.384	98	41	35	21	12.077	40	89
Max	11.63	3.3	5.343	83.832	102.695	105	72	66	23	15.169	120	128
Obs	440	440	440	440	440	440	440	440	440	440	440	440

Panel C. EU Balkan Countries												
Mean	9.358	3.122	4.0009	76.452	101.0221	103.537	61.43	54.083	23.609	13.518	105.346	101.444
Std. Dev.	0.214026	0.154386	0.355426	0.604998	0.40533345	0.509377	0.6126	0.583664	0.443051	0.437642	0.795254	0.098811
Min	8.221	0.986	3.545	71.01	100.384	98	40	37	23	12.44	39	87
Max	10.089	3.366	5.3535	81.788	102.695	102	72	63	24	15.1969	123	120
Obs	100	100	100	100	100	100	100	100	100	100	100	100

Panel D. Non-EU Balkan Countries												
Mean	8.491	2.076	3.039	75.07	101.631	100.537	60.43	52.3	20.64	11.518	102.75	109.001
Std. Dev.	0.376902	0.507135	0.330594	0.269008	0.305204207	0.03456	0.046178	0.213513	0.678664	0.7019 2	0.286881	0.356377
Min	7.551	2.141	3.456	70.005	100.244	92	40	34	21	12.277	38	88
Max	9.33	3	5.356	78.573	102.677	122	70	61	26	15.369	123	124
Obs	120	120	120	120	120	120	120	120	120	120	120	120

Panel E. High Income Countries												
Mean	10.092	3.422	4.89	78.355	104.31	104.6537	60.743	57.801	24.694	15.518	110.075	111.901
Std. Dev.	0.411248	0.212123	0.195049	0.579475	0.771330871	0.00781	0.011712	0.29029	0.179271	0.806453	0.316781	0.544943
Min	8.423	2.9999	3.546	70.259	100.384	95	41	36	26	12.177	37	77
Max	11.63	3.987	5.362	83.832	102.564	132	72	68	27	15.269	122	120
Obs	520	520	520	520	520	520	520	520	520	520	520	520

Panel F. Middle Income Countries

Mean	8.52	2.79	4.109	74.844	101.111	102.537	60.000	56.380	23.005	13.002	104.555	111.999
Std. Dev.	0.526229	0.901494	0.183938	0.854155	0.46302323	0.95795	0.294171	0.827952	0.522876	0.132035	0.43618	0.900202
Min	7.581	2.876	3.256	70.005	100.384	99.445	42.614	37.956	22.257	12.77	41.345	88
Max	9.393	3.1305	5.208	78.573	102.875	111.148	73.066	65.397	25.473	15.969	123	120
Obs	140	140	140	140	140	140	140	140	140	140	140	140

Source: Own estimates

It is not surprising to observe higher mean values of control variables such as financial development, industry, international tourism, information, communication, and technology, and trade in high-income European Union countries compared to other selected regions. These control variables are closely related to economic development and growth, and high-income European Union countries have a well-developed and diversified economy.

Financial development, which includes the development of financial institutions, capital markets, and access to credit, is critical for economic growth and development. High-income European Union countries have well-developed financial systems that enable businesses to access capital, facilitate investments, and encourage entrepreneurship. Industry refers to the manufacturing sector, which plays a vital role in economic development by generating jobs, driving innovation, and enhancing competitiveness. High-income European Union countries have a strong manufacturing base, which contributes to their economic development.

International tourism generates significant economic benefits by creating jobs, generating foreign exchange, and promoting cultural exchange. High-income European Union countries have well-established tourism industries that attract millions of visitors annually, contributing significantly to their economies. Information, communication, and technology (ICT) are critical for economic development, facilitating access to information, promoting innovation, and enhancing productivity. High-income European Union countries have well-developed ICT infrastructure, which enables businesses to operate efficiently, and individuals to access information quickly and easily. Likewise, trade is essential for economic growth and development, and high-income European Union countries have a strong trade network with other countries, facilitating the exchange of goods and services, and contributing significantly to their economies.

The lower mean values of control variables in the Non-European Union Balkan Region can be attributed to a lack of investment, political instability, and limited resources, which hinder economic development and growth. Overall, the higher mean values of control variables in high-income European Union countries demonstrate the importance of investing in financial development, industry, international tourism, ICT, and trade for economic development and growth.

The results of Jarque-Bera normality test provide validation. The Jarque-Bera test is a statistical test that is used to test the normality of a distribution. When the p-value of the Jarque-Bera test is

less than 0.05, it indicates that the distribution is not normal – and this is the case of current research. This result is important because it indicates that any conclusions drawn from the data analysis based on simple static models having the assumption of normal distribution may be unreliable. The extant literature supported the notion that in case the data is non-normal then there is a need to use appropriate non-parametric statistical tests that do not require the assumption of normality. Similarly, the correlation tables (see: Appendix), suggest that there is an issue of multicollinearity.

The Modified Wald Test and Wooldridge Test are commonly used statistical methods to test for heteroscedasticity and autocorrelation, respectively. The results are reported in Table 3. A p-value less than 0.05 indicates that the null hypothesis can be rejected, suggesting the presence of heteroscedasticity and autocorrelation in the data. When the Modified Wald Test indicates the presence of heteroscedasticity, it suggests that the variance of the errors in a regression model is not constant across residuals. This violation of the homoscedasticity assumption can lead to biased estimates of the model coefficients and incorrect inferences. To address heteroscedasticity, researchers may consider using robust standard errors or a weighted least squares approach (Hussai et al., 2023;Le et al., 2019).

In contrast, when the Wooldridge Test detects the presence of autocorrelation, it suggests that the errors in a regression model are not independent across observations, violating the assumption of the classical linear regression model. This can lead to inefficient estimates of the model coefficients and incorrect statistical inferences. Many studies have shown that ignoring autocorrelation can lead to biased estimates and incorrect conclusions in various fields, including economics (Nunes and Silva, 2021;Wu et al., 2022). To address autocorrelation, researchers may consider using generalized least squares, autoregressive integrated moving average models, or robust standard errors that account for the correlation structure of the errors. In summary, the Modified Wald Test and Wooldridge Test are essential tools for detecting and addressing heteroscedasticity and autocorrelation, respectively. Failing to account for these issues can lead to biased and inefficient estimates of model coefficients and incorrect statistical inferences.

Table 3 The Modified Wald Test and Wooldridge Test

Test value		Test statistic	P
Modified Wald (χ 2) H	Heteroscedasticity	242.5***	0.0000
Wooldridge Test (F-test)	Auto Serial Correlation	53.15***	0.0000

Statistical significance is denoted by ***, **, and * at 1, 5, and 10 percent

Source: Own estimates.

In addition, the test proposed by Pesaran (2004) has been added as a statistical test that assesses the presence of cross-sectional dependence in panel data. The results are presented in Table 4. If the p-value obtained from the test is less than 0.05, it suggests that there is cross-sectional dependence in the data. This means the presence of cross-sectional dependence in the panel data.

Table 4 Results from the cross-section independence tests Peseran (2004)

Variable	Test	P value
EG	74.00***	0
HC	116.00***	0
GOV_EE	84.00***	0
LIFE_EXP	80.21***	0
S_PRIMARY	75.34***	0
S_SECONDARYS	101.22***	0
S_TERTIARY	75.52***	0
FD	81.54***	0
Ind	115.32***	0
ITOUR	89.25***	0
ICT	105.74***	0
TRD	83.35***	0

Source: Own estimates.

Previous studies have highlighted the importance of testing for cross-sectional dependence in panel data. For example, a study by Le et al., (2020) demonstrated that failing to account for cross-sectional dependence can lead to inconsistent and biased estimates. When there is cross-sectional

dependence in the data, it can lead to biased estimates and incorrect inferences. Therefore, the extant literature suggested additional methods like D-K and FGLS models to account for cross-sectional dependence in their analysis.

5.2. Empirical Analysis of Results

5.2.1. Full Sample

The purpose of this study is to analyze the impact of human capital on economic development using six proxies for human capital, including human capital index, government expenditure on education, life expectancy, and school enrollment ratios at primary, secondary, and tertiary levels. This study would interpret the statistical significance of each proxy of human capital in establishing the relationship between human capital and economic development in Europe. It would also compare the impact of each proxy on economic growth and theoretically and contextually justify why some proxies have a greater impact than others.

Tables 5-6 illustrate the effect of human capital on economic development through static and dynamic panel estimation models in the whole sample (all considered European economies). Table 5 reports the impact of human capital proxies such as human capital index, expenditure on education and life expectancy. Whereas Table 6 presents estimated coefficients of the schooling-based proxies of human capital such as School_Primary (representing primary education), School_Secondary (secondary education) and School_Tertiary (tertiary education). Table 6 reported that the regression coefficients of human capital are significant at a 1% level of significance. This indicates a strong positive relationship between human capital and economic development in Europe. The regression coefficient of human capital index is the largest at (β_{HC} = 1.565, SE= 0,0944, p <.0001) based on Driscoll-Karay Model, indicating that one unit increase in human capital leads 1.565 units significant increase in economic growth. FGLS Model, and System GMM models also provide consistent evidence for this relationship, suggesting that investment in human capital can lead to higher GDP per capita in European countries. Similarly, the study found that government expenditure on education has a significant positive impact on economic growth across the 33 European countries. The regression coefficients for Govt Expenditure on Education ($\beta_{GovtExp}$ = 0.102, SE= 0.0176) in the Driscoll-Kraay Model, ($\beta_{GovtExp}$ =

0.102, SE= 0.141) in FGLS, and ($\beta_{GovtExp}$ = 0.00957, SE= 0.000883) in the System GMM are all statistically significant.

Table 5 Human capital and economic growth (full sample)

VARIABLES	D-K	FGLS	System GMM	D-K	FGLS	System GMM	D-K	FGLS	System GMM
L.EG			0.970***			0.969***			0.937***
			(0.00165)			(0.00499)			(0.00585)
HC	1.565***	1.565	0.189***						
	(0.0944)	(1.626)	(0.0155)						
GOV_EE				0.102***	0.102	0.00957***			
				(0.0176)	(0.141)	(0.000883)			
LIFE_EXP							0.232***	0.232***	0.00895***
							(0.00485)	(0.00717)	(0.00120)
FD	-0.00244	-0.00244	0.00109***	0.00575	0.00575	0.00185***	-0.00463	-0.00463	0.00164***
	(0.00200)	(0.0262)	(0.000179)	(0.00501)	(0.0245)	(0.000219)	(0.00440)	(0.0152)	(0.000192)
IND	0.0720***	0.0720	0.0261***	0.00786	0.00786	0.0179***	0.149***	0.149***	0.0238***
	(0.00400)	(0.0940)	(0.00152)	(0.0104)	(0.0773)	(0.00124)	(0.00663)	(0.0474)	(0.00106)
ITOUR	0.00907*	0.00907	-0.0178***	-0.00670	-0.00670	-0.0193***	0.0179	0.0179	-0.0173***
	(0.00448)	(0.0722)	(0.000762)	(0.0117)	(0.0705)	(0.000818)	(0.0110)	(0.0439)	(0.000505)
ICT	0.00251***	0.00251	-0.000891***	0.00254*	0.00254	-0.000882***	0.00239***	0.00239	-0.000899***
	(0.000322)	(0.00533)	(5.79e-05)	(0.00122)	(0.00551)	(5.96e-05)	(0.000779)	(0.00319)	(6.15e-05)
TRD	-0.000181	-0.000181	0.000405***	0.000382	0.000382	0.000658***	-0.00400*	-0.00400	0.000789***
	(0.000940)	(0.0123)	(9.65e-05)	(0.00184)	(0.0125)	(0.000130)	(0.00213)	(0.00720)	(9.26e-05)
CONSTANT	2.937***	2.937	-0.661***	9.540***	9.540***	0.124**	-11.53***	-11.53***	-0.471***
	(0.359)	(6.329)	(0.0688)	(0.365)	(2.931)	(0.0514)	(0.518)	(1.710)	(0.0527)
F-Stats	0	0		0	0		0	0	
Wald Test			0			0			0
AR(2)			0.795883			0.43332			0.46006

Hansen Test			0.897643			0.78435			0.96640
R-squared	0.019			0.019			0.619		
Observations	660	660	660	660	660	660	660	660	660
Number of id	33	33	33	33	33	33	33	33	33

Notes. Statistical significance is denoted by ***, **, and * at 1, 5, and 10 percent. Standard error in parenthesis. This table reported the regression results of the impact of human capital on economic progress. The study used gross domestic product(GDP).The study used three proxies to human capital development such as human capital(HC), government expenditure on education(GOV_EE) and life expectancy(LIFE_EXP). Whereas, control variables includes financial development (FD), industry (IND), international tourism (ITOUR), information, communication and technology (ICT) and trade(TRD). The study tested the impact of each proxies via three regression analysis techniques such as DK, FGLS and system GMM.

Source: Own estimates.

Table 6 Human Capital education component and Economic Growth (Full Sample)

	D-K	FGLS	System GMM	D-K	FGLS	System GMM	D-K	FGLS	System GMM
L.EG			0.969***			0.969***			0.966***
			(0.00478)			(0.00537)			(0.00468)
S_PRIMARY	0.00670	0.00670	0.00967***						
	(0.0304)	(0.120)	(0.000845)						
S_SECONDARY				0.0120***	0.0120	0.00323***			
				(0.00249)	(0.0236)	(0.000131)			
S_TERTIARY							0.0138***	0.0138	0.00141***
							(0.00246)	(0.0189)	(0.000143)
FD	0.00657	0.00657	0.00196***	0.00163	0.00163	0.000844***	0.00503	0.00503	0.00173***
	(0.00589)	(0.0245)	(0.000199)	(0.00417)	(0.0263)	(0.000206)	(0.00483)	(0.0245)	(0.000195)
IND	0.0161	0.0161	0.0154***	0.0388**	0.0388	0.0249***	0.0488***	0.0488	0.0219***
	(0.0219)	(0.0874)	(0.000959)	(0.0144)	(0.0858)	(0.000933)	(0.0101)	(0.0864)	(0.00134)
IT	-0.00748	-0.00748	-0.0214***	0.00575	0.00575	-0.0176***	0.00985	0.00985	-0.0171***
	(0.0143)	(0.0753)	(0.000804)	(0.0106)	(0.0742)	(0.000657)	(0.0120)	(0.0737)	(0.000681)

ICT	0.00107	0.00107	-0.00103***	0.00303***	0.00303	-0.000483***	-0.000573	-0.000573	-0.00121***
	(0.00123)	(0.00512)	(6.43e-05)	(0.000718)	(0.00641)	(6.09e-05)	(0.00117)	(0.00559)	(7.38e-05)
TRD	0.00375	0.00375	0.000925***	0.00300	0.00300	0.000562***	0.00248	0.00248	0.000928***
	(0.00223)	(0.0116)	(8.40e-05)	(0.00219)	(0.0117)	(8.61e-05)	(0.00186)	(0.0117)	(8.08e-05)
CONSTANT	7.909***	7.909	-0.835***	6.772***	6.772	-0.427***	7.143***	7.143**	-0.0936*
	(2.708)	(11.07)	(0.102)	(0.605)	(4.278)	(0.0661)	(0.403)	(3.165)	(0.0539)
F-Stats	0.000	0.000		0.000	0.000		0.000	0.000	
Wald Test			0.000			0.000			0.000
AR(2)			0.480465			0.791602			0.597972
Hansen Test			0.291859			0.985064			0.679879
R-squared	0.018			0.018			0.019		
Observations	660	660	660	660	660	660	660	660	660
Number of id	33	33	33	33	33	33	33	33	33

Notes. Statistical significance is denoted by ***, **, and * at 1, 5, and 10 percent. Standard error in parenthesis. This table reported the regression results of the impact of human capital on economic progress. The study used three proxies to human capital development such as no of students enrolled in primary level education (S_PRIMARY), secondary level education (S_SECONDARY) and territory level education (S_TERRITORY). Whereas, control variables includes financial development (FD), industry (IND), international tourism (ITOUR), information, communication and technology (ICT) and trade(TRD). The study tested the impact of each proxies via three regression analysis techniques such as DK, FGLS and system GMM.

Source: Own estimates

Those findings are consistent with the human capital theory. Human capital theory emphasizes the importance of education and training in the development of human skills and abilities, which in turn should contribute to the economic growth and productivity. The theory posits that investments in education and training are similar to investments in physical capital, such as machinery or equipment, in that they increase an individual's productivity and earning potential. As such, individuals and societies should prioritize investing in education and training to improve the overall quality of the workforce and increase economic development. Empirically, the extant literature supports the constructive role of human capital in shaping economic growth.

In view of the above it is important to say that the findings share common grounds for instance with Keji (2021), who also concluded that the education and health sectors positively impacted productivity. Similar results were also reported by, Barro (2001), who examined the role of education as a determinant of economic growth. He argued that investments in education, as a proxy for human capital, can have a positive impact on economic growth by increasing labor productivity and encouraging technological innovation. Thus this thesis findings are in line with researchers who confirm traditional human capital theories and in opposition to the researchers who find this relation as weak or even non-existent (for instance this research is in direct contradiction of the findings presented by Benhabib and Spiegel (1994) who claimed that the link between the increment of human capital and the growth rate of the output level is either moot or shows a negative relationship).

Life Expectancy showed statistically significant positive results across all three models, with regression coefficients of 0.232 (Driscoll-Kraay Model), 0.232 (FGLS Model), and 0.00895 (System GMM), respectively. These findings indicate that a country's life expectancy (which represents health quality) has a positive impact on its economic growth. The findings are consistent with the notion of Gyimah-Brempong and Wilson (2005), they also examined the health indicators as a crucial factor in determining human capital, and they found that a healthy environment accounts for between 22 and 30 percent of the economic growth rate. Barro and Sala-i-Martin (2004) employed life expectancy and mortality rates in a regression study, which they found to have a beneficial impact on growth. Existing theory like Demographic Dividend Theory supports the positive relationship between life expectancy and economic growth.

The results of the regression analysis indicate that all three levels of education, primary, secondary, and tertiary, have a statistically significant positive relationship with economic

development as proxied by the six indicators used in the study. This finding is consistent across all three approaches used, Driscoll-Kraay, FGLS, and system GMM, which provide strong evidence to support the hypothesis that human capital has a significant impact on economic development.

The coefficient estimates for School Primary are positive and statistically significant in all three instances. The magnitude of the coefficient estimate is relatively small in Driscoll-Kraay and FGLS regression techniques, but much larger in the System GMM. This finding suggests that the impact of primary education on economic development may be more substantial in the long run, as emphasized by the theory of human capital. The coefficient calculations for School Secondary are also positive and statistically significant in all three estimates. However, the magnitude of the coefficient estimate is more substantial than that of School Primary, which suggests that secondary education has a more significant impact on economic development. This finding is consistent with the theoretical notion that education is a critical determinant of human capital accumulation and that a higher level of education leads to greater productivity and economic growth. Finally, the coefficient estimates for School Tertiary are positive and statistically significant in all three variants, and the magnitude of the coefficient estimate is the most significant among all three proxies. This finding confirms the importance of tertiary education in promoting economic development, as individuals with tertiary education tend to have higher earning potential and can contribute to the development of new technologies and innovations. This is consistent with previous studies like, Abbas and Nasir (2001) who found a positive effect of secondary and tertiary education on output in Pakistan, while Self and Grabowski (2004) found that primary education and economic growth were causally related in India. Li and Liang (2010) found a positive impact of schooling on growth, although the effects were reduced with the addition of a variable for health. Contrary, Ma (2021) focused on panel data of 31 provinces in China from 1995 to 2018 and proved that education human capital and the dependency ratio had a restraining effect on economic growth.

It could be than summarized that findings of this study are consistent with endogenous growth theory. This theory suggests that technological progress and innovation are key drivers of economic growth, and that education plays a crucial role in fostering these processes. According to the endogenous growth theory, investments in education and research and development can lead to technological progress and innovation, which can in turn lead to higher economic growth. This is because education provides individuals with the skills and knowledge needed to develop new ideas and inventions, while research and development provides the resources

and incentives needed to bring these ideas to fruition. Unlike other theories of economic growth, such as the Solow-Swan model, endogenous growth theory does not assume that technological progress is exogenous or determined by factors outside of the economic system. Instead, this theory emphasizes the role of human agency in shaping economic growth, and suggests that policies aimed at promoting education and research and development can lead to sustained increases in economic growth over time. Overall, endogenous growth theory highlights the importance of education and innovation in promoting economic growth, and suggests that policies aimed at fostering these processes can have significant long-term benefits for the economy.

In conclusion, the results of the regression analysis provide strong evidence to support the hypothesis that human capital has a significant impact on economic development. The proxies for human capital used in the study, School_Primary, School_Secondary, and School_Tertiary, are all positively and statistically significantly associated with economic development. These findings are in support of existing theories of human capital accumulation and are consistent with other most recent empirical studies – especially those conducted in developing countries.

There are several possible reasons why life expectancy has a higher impact on economic growth in Europe than other proxies like primary, secondary, and tertiary level schooling and government expenditure on education. First, people who care for their health are more likely to have fruitful, long lives. They are better positioned to use their earnings to improve their competence and advance their careers (Liu et al., 2021). Their abilities to make such investments that may pay them off in the long-term increase as their life expectancy increases due to their healthy way of living. A fit individual can better participate in group activities, provide new and original ideas, and take on challenging tasks. In addition, a productive workforce is a sign of a successful organization (Morand & Merriman, 2012). Second, human capital proxies such as health, knowledge, and standard of living may have a more direct and comprehensive effect on economic growth than proxies like government expenditure on education or schooling levels in countries where all of those are already at relatively high level. For example, research by Morand & Merriman (2012) suggests that life expectancy has a strong and positive impact on economic growth in Europe, as it contributes to a healthier workforce, higher productivity, and lower healthcare costs.

Third, it may be that life expectancy as proxy of human capital is more relevant or better measured in the European context. For instance, life expectancy and health may have a stronger

impact on economic growth in Europe due to the region's aging population and the increased importance of healthcare spending. Similarly, the quality of education and the level of educational attainment may vary widely across different European countries, making it difficult to draw general conclusions about the impact of education on economic growth across the entire region (Sultana et al., 2022). However, it is important to note that the impact of human capital proxies used in this study on economic growth may also depend on a range of other factors, including the level of economic development, institutional quality, and macroeconomic policies. Thus, while the conclusions retrieved from the estimates on the full European sample are important, it is necessary to look into the phenomenon on the sub-regional level. Balkan countries provide an excellent test bed to look for possible differences due to their division on less and more developed (as measured by income) as well as EU and non-EU members.

5.2.2. European Union Countries

Tables 7-8 illustrate the effect of human capital on economic development through static and dynamic panel estimation models in sub sample of European Union economies. Table 7 reports the impact of human capital proxies such as human capital, expenditure on education and life expectancy. Whereas, Table 8 presents estimated coefficients of the schooling-based proxies of human capital such as School_Primary, School_Secondary and School_Tertiary. Table 8 illustrates that the regression coefficients of human capital, government expenditure on education and life expectancy in the European Union suggest that these proxies have a significant impact on economic development in the European Union. Based on the estimate following Driscoll-Kraay, human capital has a positive impact on economic development with a coefficient of 1.535, while government expenditure on education has a negative impact on economic development with a coefficient of -0.103. Life expectancy, on the other hand, has a positive impact on economic development with a coefficient of 0.178. These findings are consistent with existing theories that suggest that human capital and health have a positive impact on economic development, while the relationship between government expenditure on education and economic development is found to have adverse effect. However, this result might be explained by the complexity of the process. How government spending help in developing human capital is more complex than simply taking into consideration the volume of the cash flow and depends on various factors such as the efficiency of education spending and the quality of education (Belgi Turan, 2020).

Similarly, the regression coefficients of School_Primary, School_Secondary, and School_Tertiary based on System GMM show that all three proxies are statistically significant in establishing the relationship between human capital and economic development in the context of the European Union. The positive regression coefficients for all three proxies indicate that higher enrollment rates in primary, secondary, and tertiary education lead to greater economic development. The findings of this study for the EU countries are in line with the theory of human capital, which suggests that investing in education and training can improve the skills and knowledge of the workforce, leading to increased productivity and economic growth. The education system in the European Union has been a major focus of policymakers, and the results of this study highlight the importance of increasing enrollment rates in primary, secondary, and tertiary education. The theory has been applied also in other regions. Siddiqui (2006) examined the human capital and growth relationship for South Asian countries and found that human capital measured by total school enrolment was endogenous to growth in South Asia. Contrary, Filmer and Pritchett (1999) showed that average years of schooling were not significant in explaining different countries' economic growth rates. The positive impact of human capital and life expectancy on economic development in the European Union economies is consistent with notion of endogenous growth theory.

However, it can be observed that the direct impact of human capital (index) carries greater impact on economic growth than other factors such as education and health. These findings are consistent with the notion that human capital encompasses more than just education and health. Human capital also includes skills, knowledge, and abilities acquired through on-the-job training, work experience, and other forms of non-formal education. Moreover, education and health are only two dimensions of human capital, and they may not fully capture the impact of all aspects of human capital on economic development. Several existing theories support this finding. For example, the endogenous growth theory argues that investments in education and human capital are crucial drivers of long-term economic growth. The theory suggests that human capital can lead to technological advancements, which in turn can lead to productivity gains and economic growth. Moreover, the human capital theory suggests that investments in education and training can improve the quality of the workforce and lead to higher wages, better employment opportunities, and higher economic growth

Table 7 Model estimates for developed EU countries

VARIABLES	D-K	FGLS	System GMM	D-K	FGLS	System GMM	D-K	FGLS	System GMM
L.EG			0.958***			0.959***			0.924***
			(0.00756)			(0.00723)			(0.00979)
HC	1.535***	1.535	0.167***						
	(0.103)	(1.355)	(0.0153)						
GOV_EE				-0.103***	-0.103	-0.0106***			
				(0.0172)	(0.118)	(0.00105)			
LIFE_EXP							0.178***	0.178***	0.00743***
							(0.00597)	(0.00615)	(0.00208)
FD	-0.00246	-0.00246	0.00190***	0.00556	0.00556	0.00270***	-0.00219	-0.00219	0.00243***
	(0.00213)	(0.0218)	(0.000160)	(0.00470)	(0.0204)	(0.000200)	(0.00380)	(0.0126)	(0.000221)
IND	0.0810***	0.0810	0.0249***	0.0178*	0.0178	0.0182***	0.130***	0.130***	0.0234***
	(0.00458)	(0.0784)	(0.00148)	(0.00957)	(0.0644)	(0.00110)	(0.00486)	(0.0393)	(0.00134)
ITOUR	0.00773	0.00773	-0.0193***	-0.00776	-0.00776	-0.0211***	0.0117	0.0117	-0.0187***
	(0.00477)	(0.0601)	(0.000842)	(0.0111)	(0.0587)	(0.000823)	(0.00813)	(0.0364)	(0.000696)
ICT	0.00234***	0.00234	-0.00115***	0.00242*	0.00242	-0.00113***	0.00191**	0.00191	-0.00115***
	(0.000351)	(0.00444)	(3.90e-05)	(0.00117)	(0.00459)	(4.61e-05)	(0.000722)	(0.00264)	(6.70e-05)
TRD	-0.000615	-0.000615	0.000376***	-0.000156	-0.000156	0.000472***	-0.00276	-0.00276	0.000759***
	(0.000964)	(0.0102)	(9.76e-05)	(0.00174)	(0.0104)	(0.000152)	(0.00185)	(0.00597)	(0.000156)
CONSTANT	3.233***	3.233	-0.437***	9.739***	9.739***	0.255***	-6.879***	-6.879***	-0.193
	(0.395)	(5.274)	(0.0849)	(0.349)	(2.443)	(0.0604)	(0.499)	(1.425)	(0.201)
F-Stats	0.000	0.000		0.000	0.000		0.000	0.000	
Wald Test			0.000			0.000			0.000

AR(2)			0.2680			0.8068			0.6711
Hansen Test			0.4088			0.3382			0.3149
R-squared	0.025			0.024			0.626		
Observations	520.0	520.0	520.0	520.0	520.0	520.0	520.0	520.0	520.0
Number of id	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00

Notes. Statistical significance is denoted by ***, **, and * at 1, 5, and 10 percent. Standard error in parenthesis. This table reported the regression results of the impact of human capital on economic progress. The study used three proxies to human capital development such as no of students enrolled in primary level education (S_PRIMARY), secondary level education (S_SECONDARY) and territory level education (S_TERRITORY). Whereas, control variables includes financial development (FD), industry (IND), international tourism (ITOUR), information, communication and technology (ICT) and trade (TRD). The study tested the impact of each proxy via three regression analysis techniques such as DK, FGLS and system GMM.

Source: Own estimates.

Table 8 Model estimated for developed EU countries (schooling)

VARIABLES	D-K	FGLS	System GMM	D-K	FGLS	System GMM	D-K	FGLS	System GMM
L.EG			0.963***			0.962***			0.963***
			(0.00966)			(0.00775)			(0.00980)
S_PRIMARY	0.00736	0.00736	0.00819***						
	(0.0295)	(0.100)	(0.000763)						
S_SECONDARY				0.0117***	0.0117	0.00280***			
				(0.00247)	(0.0197)	(0.000216)			
S_TERTIARY							0.0137***	0.0137	0.00111***
							(0.00243)	(0.0157)	(0.000147)
FD	0.00639	0.00639	0.00273***	0.00156	0.00156	0.00179***	0.00485	0.00485	0.00250***
	(0.00561)	(0.0204)	(0.000181)	(0.00404)	(0.0219)	(0.000166)	(0.00453)	(0.0205)	(0.000171)
IND	0.0259	0.0259	0.0161***	0.0484***	0.0484	0.0241***	0.0585***	0.0585	0.0214***
	(0.0214)	(0.0729)	(0.00105)	(0.0136)	(0.0716)	(0.00144)	(0.00936)	(0.0720)	(0.00158)

IT	-0.00868	-0.00868	-0.0221***	0.00442	0.00442	-0.0189***	0.00864	0.00864	-0.0187***
	(0.0140)	(0.0628)	(0.00105)	(0.0103)	(0.0619)	(0.000844)	(0.0117)	(0.0614)	(0.000822)
ICT	0.000936	0.000936	-0.00127***	0.00284***	0.00284	-0.000798***	-0.000695	-0.000695	-0.00141***
	(0.00118)	(0.00427)	(5.33e-05)	(0.000699)	(0.00534)	(3.47e-05)	(0.00112)	(0.00466)	(5.69e-05)
TRD	0.00323	0.00323	0.000808***	0.00251	0.00251	0.000465***	0.00199	0.00199	0.000822***
	(0.00220)	(0.00966)	(9.33e-05)	(0.00217)	(0.00972)	(8.92e-05)	(0.00178)	(0.00975)	(8.58e-05)
CONSTANT	8.040***	8.040	-0.624***	7.004***	7.004**	-0.267***	7.347***	7.347***	-0.00579
	(2.602)	(9.225)	(0.0792)	(0.577)	(3.566)	(0.0724)	(0.399)	(2.638)	(0.0753)
F-Stats	0.000	0.000		0.000	0.000		0.000	0.000	
Wald Test			0.000			0.000			0.000
AR(2)			0.1595			0.7775			0.8847
Hansen Test			0.2638			0.7049			0.9088
R-squared	0.023			0.023			0.024		
Observations	520.0	520.0	520.0	520.0	520.0	520.0	520.0	520.0	520.0
Number of id	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00

Notes. Statistical significance is denoted by ***, **, and * at 1, 5, and 10 percent. Standard error in parenthesis. This table reported the regression results of the impact of human capital on economic progress The study used three proxies to human capital development such as no of students enrolled in primary level education (S_PRIMARY), secondary level education (S_SECONDARY) and territory level education (S_TERRITORY). Whereas, control variables includes financial development (FD), industry (IND), international tourism (ITOUR), information, communication and technology (ICT) and trade(TRD) The study tested the impact of each proxies via three regression analysis techniques such as DK, FGLS and system GMM.

Source: Own estimates.

5.2.3. European Union Balkan Region

Tables 9-10 illustrate the effect of human capital on economic development through static and dynamic panel estimation models in the Balkan Region of European Union. Table 9 reported the impact of human capital proxies such as human capital index, expenditure on education and life expectancy. Whereas, Table 10 presented estimated coefficients of the schooling-based proxies of human capital such as School_Primary, School_Secondary and School_Tertiary. Table 10 reported the regression coefficient for human capital is 0.460 with a standard error of 0.0895 based on system GMM. This indicates that an increase in human capital by one standard deviation leads to a 0.46 unit increase in economic development, all else being equal. This finding is statistically significant at the 1% level. The findings are consistent with more recent studies like Egbetokun, and Memon (2018) and Deng and Long (2017).

The regression coefficient for government expenditure on education is -0.0106 with a standard error of 0.00105 based on system GMM. This indicates that an increase in government expenditure on education by one standard deviation leads to a 0.01 unit decrease in economic development, all else being equal. This finding is statistically significant at the 1% level. This result may seem counterintuitive since education is an important component of human capital. However, it may be possible that increased government expenditure on education is not being allocated efficiently or effectively, resulting in a negative impact on economic development. These findings are consistent with explanations provided by Ma (2021). Nevertheless, contradictory results can be found in the majority of current literature, as most studies found that government expenditure on education has a positive impact on economic growth (see for instance Fahimi et al., 2018).The findings are also contradictory with Gülmez and Yardımcıoğlu (2012) study for similar than Balkan Region setting; they also established a strong integration relationship between research and development expenditure and economic growth. This is an important insight while comparing all EU countries vs Balkan EU only. While for the EU in general the relation of economic growth and human capital is positive, for the Balkan sub-group of EU countries it is not.

The regression coefficient for life expectancy is 0.174 with a standard error of 0.00564 based on system GMM. This indicates that an increase in life expectancy by one standard deviation leads to a 0.174 unit increase in economic development, all else being equal. This finding is statistically significant at the 1% level. This result is consistent with the theory that an increase in life expectancy is an indicator of improved health, which is a component of human capital.

A healthy population is more productive, leading to an increase in overall economic output. Recent studies support this relationship, Abbas et al.(2020) for instance. These findings also support the claims of Ogundari and Awokuse (2018), who found that a healthy and educated workforce is essential to economic growth for less developed economies.

Overall, these findings suggest that investing in human capital is an important driver of economic development. Improving access to education, health, and training can lead to a more productive and efficient workforce, which in turn can drive economic growth. However, it is important to note that government expenditure on education may not always have a positive impact on economic development if it is not allocated efficiently or effectively.

This research finds also that the human capital index (so to speak human capital measured directly not through proxies) has a higher impact on economic development in the Balkan Region of the European Union than the three proxies of human capital related to education (School_Primary, School_Secondary, and School_Tertiary). This may be because the human capital measures at the same time a broader range of factors related to knowledge, health, and standard of living, which are all crucial components of human capital. The finding could be set against other studies which looked into developing countries like Siddiqui and Rehman (2017), who established the impact of human capital on economic growth based on 9 Asian countries over the period of 1972–2014. That study found that primary and secondary education was more prominent in explaining the fluctuations of economic growth in East Asia. Contrary, Amassoma and Nwosa (2011) examined the relationship between human capital investment and economic growth in Nigeria between 1970 and 2009. The findings disclosed that there was no nexus and causal links between investment in human capital and economic growth.

Additionally, investing in education alone may not be sufficient to enhance human capital and promote economic development in case of developing countries or those whose initial economic level is low. The quality of education and the relevance of the skills and knowledge acquired also play a crucial role. Furthermore, factors such as access to healthcare, nutrition, and clean water can also impact human capital at its basic level and, in turn, economic development. For many less developed countries, where standard of living is also lower this could be a factor influencing results while it is fully omitted (or taken as obvious existing condition) for more developed economies. Overall, the study suggests that a more comprehensive approach that considers various components of human capital, including

education, health, and standard of living, is necessary to understand details of the economic development in the Balkan Region of the European Union.

Table 9 Model Estimates for EU Balkan Region

VARIABLES	D-K	FGLS	System GMM	D-K	FGLS	System GMM	D-K	FGLS	System GMM
L.EG			0.966***			0.967***			0.985***
			(0.00559)			(0.00571)			(0.0204)
HC	2.010***	2.010	0.460***						
	(0.202)	(2.442)	(0.0895)						
GOV_EE				-0.136***	-0.136	-0.0205***			
				(0.0212)	(0.213)	(0.00794)			
LIFE_EXP							0.174***	0.174***	0.00138
							(0.0122)	(0.00564)	(0.00346)
FD	-0.00551	-0.00551	-0.00190	0.00497	0.00497	0.000349	-0.00207	-0.00207	0.000236
	(0.00393)	(0.0393)	(0.00138)	(0.00692)	(0.0368)	(0.00134)	(0.00712)	(0.0114)	(0.00135)
IND	0.112***	0.112	0.0450***	0.0294**	0.0294	0.0267***	0.141***	0.141***	0.0275***
	(0.00701)	(0.141)	(0.00513)	(0.0134)	(0.116)	(0.00414)	(0.0118)	(0.0354)	(0.00470)
ITOUR	0.0207**	0.0207	-0.00634	0.000448	0.000448	-0.00960**	0.0311**	0.0311	-0.00847**
	(0.00878)	(0.108)	(0.00408)	(0.0169)	(0.106)	(0.00420)	(0.0134)	(0.0327)	(0.00425)
ICT	0.00536***	0.00536	-0.000624**	0.00549***	0.00549	-0.000775**	0.00397***	0.00397*	-0.00118***
	(0.000633)	(0.00800)	(0.000285)	(0.00164)	(0.00828)	(0.000302)	(0.00132)	(0.00237)	(0.000296)
TRD	-0.00286	-0.00286	0.00152**	-0.00233	-0.00233	0.00220***	-0.00224	-0.00224	0.00315***
	(0.00176)	(0.0184)	(0.000727)	(0.00280)	(0.0188)	(0.000758)	(0.00351)	(0.00537)	(0.000687)
CONSTANT	0.202	0.202	-2.071***	8.741***	8.741**	-0.255	-7.788***	-7.788***	-0.505**
	(0.748)	(9.507)	(0.339)	(0.475)	(4.408)	(0.172)	(0.917)	(1.284)	(0.203)
F-Stats	0.000	0.000		0.000	0.000		0.000	0.000	

Wald Test			0.000			0.000			0.000
AR(2)			0.84535			0.13790			0.31507
Hansen Test			0.93209			0.70622			0.02040
R-squared	0.064			0.062			0.911		
Observations	100	100	100	100	100	100	100	100	100
Number of id	5.000	5.000	5.000	5.000	5.000	5.000	5.000	5.000	5.000

Notes. Statistical significance is denoted by ***, **, and * at 1, 5, and 10 percent. Standard error in parenthesis. This table reported the regression results of the impact of human capital on economic progress. The study used gross domestic product(GDP).The study used three proxies to human capital development such as human capital(HC), government expenditure on education(GOV_EE) and life expectancy(LIFE_EXP). Whereas, control variables includes financial development (FD), industry (IND), international tourism (ITOUR), information, communication and technology (ICT) and trade(TRD). The study tested the impact of each proxies via three regression analysis techniques such as DK, FGLS and system GMM.

Source: Own estimates.

Table 10 Model estimates for schooling effects in EU Balkan Region

VARIABLES	D-K	FGLS	System GMM	D-K	FGLS	System GMM	D-K	FGLS	System GMM
L.EG			0.969***			0.968***			0.968***
			(0.00555)			(0.00569)			(0.00574)
S_PRIMARY	0.00650	0.00650	0.0225***						
	(0.0403)	(0.181)	(0.00639)						
S_SECONDARY				0.0133***	0.0133	0.00769***			
				(0.00412)	(0.0355)	(0.00143)			
S_TERTIARY							0.0188***	0.0188	0.00191*

							(0.00353)	(0.0284)	(0.00102)
FD	0.00606	0.00606	0.000558	0.000547	0.000547	-0.00204	0.00397	0.00397	8.39e-05
	(0.00795)	(0.0369)	(0.00131)	(0.00576)	(0.0396)	(0.00141)	(0.00672)	(0.0369)	(0.00135)
IND	0.0412	0.0412	0.0207***	0.0662***	0.0662	0.0429***	0.0847***	0.0847	0.0327***
	(0.0276)	(0.132)	(0.00455)	(0.0206)	(0.129)	(0.00489)	(0.0137)	(0.130)	(0.00468)
IT	-4.44e-05	-4.44e-05	-0.0142***	0.0145	0.0145	-0.00546	0.0229	0.0229	-0.00604
	(0.0213)	(0.113)	(0.00442)	(0.0162)	(0.112)	(0.00418)	(0.0176)	(0.111)	(0.00431)
ICT	0.00353**	0.00353	-0.00108***	0.00570***	0.00570	0.000230	0.00129	0.00129	-0.00132***
	(0.00167)	(0.00771)	(0.000269)	(0.000983)	(0.00964)	(0.000369)	(0.00169)	(0.00840)	(0.000300)
TRD	0.00220	0.00220	0.00277***	0.00136	0.00136	0.00184***	0.000458	0.00058	0.00290***
	(0.00332)	(0.0175)	(0.000663)	(0.00327)	(0.0176)	(0.000713)	(0.00284)	(0.0176)	(0.000684)
CONSTANT	6.778*	6.778	-2.491***	5.422***	5.422	-1.540***	5.503***	5.503	-0.670***
	(3.594)	(16.67)	(0.586)	(0.925)	(6.441)	(0.243)	(0.575)	(4.759)	(0.174)
F-Stats	0.000	0.000		0.000	0.000		0.000	0.000	
Wald Test			0.000			0.000			0.000
AR(2)			0.28842			0.34985			0.68151
Hansen Test			0.83505			0.77023			0.56706
R-squared	0.058			0.059			0.062		

Observations	100	100	100	100	100	100	100	100	100
Number of id	5.000	5.000	5.000	5.000	5.000	5.000	5.000	5.000	5.000

Notes. Statistical significance is denoted by ***, **, and * at 1, 5, and 10 percent. Standard error in parenthesis. This table reported the regression results of the impact of human capital on economic progress. The study used three proxies to human capital development such as no of students enrolled in primary level education (S_PRIMARY), secondary level education (S_SECONDARY) and territory level education (S_TERRITORY). Whereas, control variables includes financial development (FD), industry (IND), international tourism (ITOUR), information, communication and technology (ICT) and trade(TRD). The study tested the impact of each proxies via three regression analysis techniques such as DK, FGLS and system GMM.

Source: Own estimate

5.2.4. Non-EU Balkan Region

Final set of estimates was conducted on the sub-sample of the non-EU Balkan countries. Tables 11-12 present the effect of human capital on economic development through static and dynamic panel estimation models in Non-European Union -Balkan Region. Table 11 reports the impact of human capital and proxies of human capital like expenditure on education and life expectancy. Whereas, table 12 presents estimated coefficients of the schooling-based proxies of human capital such as School_Primary, School_Secondary and School_Tertiary. Table 12 reports the results of the study indicating that human capital, as measured by the selected variables, has a statistically significant positive effect on economic development in the Non-European Union Balkan Region. Again, it could be stated that findings are in support of the dominant existing theories such as the human capital theory, which posits that investment in education and training enhances the skills and knowledge of the workforce, thereby increasing productivity and economic growth. Additionally, the findings suggest that government expenditure on education has a positive impact on economic development, which is consistent with the argument that government spending on education is essential for the provision of public goods and services that enhance the capabilities of the workforce. Non-Eu Balkan countries during past two decades had significantly lower economic potential than their EU counterparts. Thus, the probably best comparisons could be made against other lower income countries. For instance, current findings are consistent with literature, like Reza and Widodo (2013) who found that education per worker had a significant and positive impact on economic growth in Indonesia.

Moreover, the positive relationship between life expectancy and economic development observed in this final set of models suggests that improving health can increase productivity and economic growth, as healthy individuals are more productive and less likely to be absent from work due to illness. Again the reference point could be a study of Mayer-Foulkes (2008) which shows that a healthy well-informed and educated staff promotes a productive work environment by lowering rates of absenteeism and illness. According to Thomas and Frankenberg (2002), a long healthy life expectancy can boost economic growth. In addition, there would be more opportunities for training and education, increasing the likelihood of a productive workforce that can keep pace with developing technologies (Ahmed, 2021). It has to be however mentioned that in respect to health

the findings are inconsistent with findings of other researchers who looked into lower income countries like Amassoma and Nwosa (2011).

Table 12 presents the results of the regression analysis using the System GMM and indicate that the proxies of human capital such as School_Primary, School_Secondar and School_Tertiary have a statistically significant relationship with economic development in the Non-European Union Balkan Region. The positive regression coefficients suggest that increasing the enrollment ratios in primary, secondary, and tertiary education can lead to higher economic growth rates in the region. This finding is again consistent with this aspect of the theory of human capital, which suggests that investment in education and training can enhance the skills and knowledge of the workforce, leading to higher productivity and economic growth.

Table 11 Model estimates for Non-EU Balkan Region

VARIABLES	D-K	FGLS	System GMM	D-K	FGLS	System GMM	D-K	FGLS	System GMM
L.EG			0.841***			0.940***			1.011***
			(0.0429)			(0.0409)			(0.0164)
HC	1.631***	1.631	0.472***						
	(0.0768)	(1.403)	(0.103)						
GOV_EE				0.0938***	0.0938***	0.0116***			
				(0.0197)	(0.0122)	(0.0051)			
LIFE_EXP							0.177***	0.177***	0.0151***
							(0.0266)	(0.0241)	(0.00489)
FD	-0.00199	-0.00199	-0.00214*	0.00664	0.00664	-0.000651	0.0176	0.0176	-0.00196
	(0.00195)	(0.0226)	(0.00124)	(0.00636)	(0.0212)	(0.00134)	(0.0122)	(0.0177)	(0.00133)
IND	0.0344***	0.0344	0.0290***	-0.0311**	-0.0311	0.0151***	-0.113**	-0.113**	0.0272***
	(0.00398)	(0.0811)	(0.00463)	(0.0138)	(0.0669)	(0.00446)	(0.0461)	(0.0560)	(0.00496)
ITOUR	0.0140***	0.0140	-0.00921**	-0.00233	-0.00233	-0.0133***	-0.0187	-0.0187	-0.0130***
	(0.00456)	(0.0623)	(0.00376)	(0.0141)	(0.0610)	(0.00406)	(0.0286)	(0.0508)	(0.00402)
ICT	0.00268***	0.00268	0.000731***	0.00254*	0.00254	0.000337	-5.30e-05	-5.30e-05	0.000202
	(0.000286)	(0.00460)	(0.000276)	(0.00147)	(0.00477)	(0.000306)	(0.00266)	(0.00369)	(0.000268)
TRD	0.00174	0.00174	0.000452	0.00274	0.00274	0.00106	0.0116**	0.0116	0.000572
	(0.00109)	(0.0106)	(0.000652)	(0.00226)	(0.0108)	(0.000732)	(0.00469)	(0.00836)	(0.000699)
CONSTANT	2.027***	2.027	-0.670**	8.784***	8.784***	0.303	22.48***	22.48***	-1.637***
	(0.280)	(5.461)	(0.328)	(0.440)	(2.536)	(0.405)	(2.989)	(2.710)	(0.494)
F-Stats	0.000	0.000		0.000	0.000		0.000	0.000	
Wald Test			0.000			0.000			0.000

AR(2)			0.44305			0.14416			0.78133
Hansen Test			0.76910			0.19432			0.94960
R-squared	0.272			0.267			0.493		
Observations	120	120	120	120	120	120	120	120	120
Number of id	6.000	6.000	6.000	6.000	6.000	6.000	6.000	6.000	6.000

Notes: statistical significance is denoted by ***, **, and * at 1, 5, and 10 percent. Standard error in parenthesis. This table reported the regression results of the impact of human capital on economic progress. The study used gross domestic product(GDP).The study used three proxies to human capital development such as human capital(HC), government expenditure on education(GOV_EE) and life expectancy(LIFE_EXP). Whereas, control variables includes financial development (FD), industry (IND), international tourism (ITOUR), information, communication and technology (ICT) and trade(TRD). The study tested the impact of each proxies via three regression analysis techniques such as DK, FGLS and system GMM.

Source: Own estimates.

Table 12 Model estimates for schooling effects in Non-EU Balkan Region

VARIABLES	D-K	FGLS	System GMM	D-K	FGLS	System GMM	D-K	FGLS	System GMM
L.EG			0.970***			0.925***			0.915***
			(0.0349)			(0.0352)			(0.0395)
S_PRIMARY	0.00616	0.00616	0.0141**						
	(0.0347)	(0.104)	(0.00601)						
S_SECONDARY				0.0129***	0.0129	0.00517***			
				(0.00293)	(0.0204)	(0.00132)			
S_TERTIARY							0.0139***	0.0139	0.00292***
							(0.00276)	(0.0163)	(0.00105)
FD	0.00740	0.00740	-0.000746	0.00206	0.00206	-0.00213*	0.00584	0.00584	-0.000774
	(0.00712)	(0.0212)	(0.00126)	(0.00474)	(0.0228)	(0.00126)	(0.00611)	(0.0212)	(0.00128)
IND	-0.0235	-0.0235	0.0125***	0.000691	0.000691	0.0253***	0.00918	0.00918	0.0216***
	(0.0237)	(0.0758)	(0.00447)	(0.0180)	(0.0743)	(0.00440)	(0.0130)	(0.0747)	(0.00436)
IT	-0.00304	-0.00304	-0.0167***	0.0110	0.0110	-0.0105***	0.0143	0.0143	-0.00898**

	(0.0158)	(0.0653)	(0.00419)	(0.0120)	(0.0642)	(0.00377)	(0.0139)	(0.0638)	(0.00413)
ICT	0.00119	0.00119	0.000138	0.00330***	0.00330	0.00106***	-0.000465	-0.000465	-0.000160
	(0.00147)	(0.00444)	(0.000254)	(0.000806)	(0.00555)	(0.000342)	(0.00142)	(0.00483)	(0.000278)
TRD	0.00584**	0.00584	0.00121*	0.00503**	0.00503	0.000797	0.00457*	0.00457	0.00138**
	(0.00244)	(0.0101)	(0.000650)	(0.00235)	(0.0101)	(0.000645)	(0.00223)	(0.0101)	(0.000651)
CONSTANT	7.283**	7.283	-1.319**	5.955***	5.955	-0.417	6.460***	6.460**	0.0895
	(3.173)	(9.594)	(0.633)	(0.747)	(3.704)	(0.316)	(0.436)	(2.737)	(0.316)
F-Stats	0.000	0.000		0.000	0.000		0.000	0.000	
Wald Test			0.000			0.000			0.000
AR(2)			0.56953			0.51870			0.18027
Hansen Test			0.62063			0.97250			0.24874
R-squared	0.264			0.266			0.268		
Observations	120	120	120	120	120	120	120	120	120
Number of id	6.000	6.000	6.000	6.000	6.000	6.000	6.000	6.000	6.000

Notes. Statistical significance is denoted by ***, **, and * at 1, 5, and 10 percent. Standard error in parenthesis. This table reported the regression results of the impact of human capital on economic progress. The study used three proxies to human capital development such as no of students enrolled in primary level education (S_PRIMARY), secondary level education (S_SECONDARY) and territory level education (S_TERRITORY). Whereas, control variables includes financial development (FD), industry (IND), international tourism (ITOUR), information, communication and technology (ICT) and trade(TRD). The study tested the impact of each proxies via three regression analysis techniques such as DK, FGLS and system GMM.

Source: Own estimates.

5.2.5. High Income EU Countries & Middle-Income EU Countries

The further insight into the EU countries allows to check the effects in relation to the overall economic well-being. Tables 13-14 present the effect of human capital on economic development in high- and middle-income countries which compose European Union economies.

Keeping in view the comparison related to the impact of human capital on economic development, it could be reported that human capital has greater positive impact on economic growth in middle income European countries than in high income European countries. The findings are consistent with theoretical reasoning that middle income European countries may have more room for improvement in their human capital development compared to high income European countries, which may have already invested heavily in their education and healthcare systems. As a result, increasing investments in human capital development may have a larger impact on economic growth in middle income European countries compared to high income European countries. Secondly, middle income European countries may face greater challenges related to brain drain, where highly skilled workers emigrate to higher paying jobs in other countries. By investing in human capital development, middle income European countries may be able to retain and attract highly skilled workers, which can have a positive impact on economic growth Sarwar et al. (2020). Thirdly, middle income European countries may be more reliant on human capital-intensive industries, such as technology and services, compared to high income European countries that may have a larger share of their economy focused on capital-intensive industries, such as manufacturing. Therefore, investments in human capital development may have a greater impact on economic growth in middle income European countries that rely more heavily on human capital-intensive industries (Barro and Lee, 1996).

However, the human capital proxies like School_Primary, School_Secondar have greater positive impact on economic growth in high income European countries vis-à-vis middle income European countries except School_Tertiary. One possible explanation for why human capital proxies related to education have a greater positive impact on economic growth in high income European countries than in middle income European countries is the quality of education. High income countries tend to have better education systems, with more resources, higher teacher salaries, and better infrastructure. This can lead to better quality education and higher levels of human capital

development. Moreover, high-income countries tend to have more advanced economies that require more specialized skills and knowledge. The education system in these countries may be better equipped to provide the necessary education and training to meet the demands of these specialized jobs, which can lead to a more efficient workforce and higher levels of productivity. Considering the above results, the role of primary school enrolment becomes a more reliable and significant factor for sustainable economic growth in developing economies. The findings support the arguments of Petrakis and Stamatakis (2002) study that primary and secondary level education reflects the growth rate of developing countries, while high-income developed countries achieved more benefits from tertiary level education.

Table 13 Model estimates for high income EU countries

VARIABLES	D-K	FGLS	System GMM	D-K	FGLS	System GMM	D-K	FGLS	System GMM
L.EG			0.962***			0.963***			0.920***
			(0.00579)			(0.00632)			(0.00729)
HC	1.550***	1.550	0.174***						
	(0.104)	(1.414)	(0.0164)						
GOV_EE				-0.104***	-0.104	-0.0109***			
				(0.0174)	(0.123)	(0.000988)			
LIFE_EXP							0.189***	0.189***	0.00992***
							(0.00617)	(0.00592)	(0.00201)
FD	-0.00254	-0.00254	0.00170***	0.00556	0.00556	0.00256***	-0.00235	-0.00235	0.00222***
	(0.00213)	(0.0228)	(0.000144)	(0.00476)	(0.0213)	(0.000190)	(0.00396)	(0.0126)	(0.000272)
IND	0.0803***	0.0803	0.0257***	0.0165	0.0165	0.0186***	0.135***	0.135***	0.0252***
	(0.00446)	(0.0818)	(0.00127)	(0.00976)	(0.0672)	(0.00103)	(0.00513)	(0.0391)	(0.00148)
ITOUR	0.00797	0.00797	-0.0190***	-0.00767	-0.00767	-0.0208***	0.0128	0.0128	-0.0179***
	(0.00479)	(0.0628)	(0.000750)	(0.0113)	(0.0613)	(0.000792)	(0.00878)	(0.0362)	(0.000791)
ICT	0.00247***	0.00247	-0.00111***	0.00254**	0.00254	-0.00111***	0.00207**	0.00207	-0.00110***
	(0.000350)	(0.00463)	(3.40e-05)	(0.00118)	(0.00479)	(3.70e-05)	(0.000749)	(0.00263)	(7.20e-05)
TRD	-0.000609	-0.000609	0.000426***	-0.000142	-0.000142	0.000527***	-0.00308	-0.00308	0.000747***
	(0.000962)	(0.0107)	(8.28e-05)	(0.00177)	(0.0109)	(0.000146)	(0.00193)	(0.00594)	(0.000176)
CONSTANT	3.139***	3.139	-0.521***	9.708***	9.708***	0.208***	-7.823***	-7.823***	-0.396**
	(0.397)	(5.504)	(0.0773)	(0.352)	(2.550)	(0.0543)	(0.533)	(1.411)	(0.197)
F-Stats	0.000	0.000		0.000	0.000		0.000	0.000	
Wald Test			0.000			0.000			0.000

AR(2)			0.5560			0.6004			0.4844
Hansen Test			0.7285			0.2079			0.6573
R-squared	0.024			0.023			0.660		
Observations	540.0	540.0	540.0	540.0	540.0	540.0	540.0	540.0	540.0
Number of id	27.00	27.00	27.00	27.00	27.00	27.00	27.00	27.00	27.00

Notes. Statistical significance is denoted by ***, **, and * at 1, 5, and 10 percent. Standard error in parenthesis. This table reported the regression results of the impact of human capital on economic progress. The study used gross domestic product(GDP).The study used three proxies to human capital development such as human capital(HC), government expenditure on education(GOV_EE) and life expectancy(LIFE_EXP). Whereas, control variables includes financial development (FD), industry (IND), international tourism (ITOUR), information, communication and technology (ICT) and trade(TRD). The study tested the impact of each proxies via three regression analysis techniques such as DK, FGLS and system GMM.

Source: Own estimates.

Table 14 Model estimates of schooling effects in high income EU countries

VARIABLES	D-K	FGLS	System GMM	D-K	FGLS	System GMM	D-K	FGLS	System GMM
L.EG			0.962***			0.964***			0.963***
			(0.00787)			(0.00840)			(0.00816)
S_PRIMARY	0.00683	0.00683	0.00797***						
	(0.0298)	(0.105)	(0.000759)						
S_SECONDARY				0.0117***	0.0117	0.00294***			
				(0.00247)	(0.0205)	(0.000130)			
S_TERTIARY							0.0138***	0.0138	0.00112***
							(0.00246)	(0.0164)	(0.000140)
FD	0.00639	0.00639	0.00258***	0.00154	0.00154	0.00165***	0.00484	0.00484	0.00237***
	(0.00568)	(0.0213)	(0.000192)	(0.00410)	(0.0229)	(0.000165)	(0.00460)	(0.0214)	(0.000193)
IND	0.0249	0.0249	0.0166***	0.0473***	0.0473	0.0250***	0.0575***	0.0575	0.0219***

	(0.0217)	(0.0760)	(0.00106)	(0.0138)	(0.0747)	(0.00117)	(0.00958)	(0.0752)	(0.00155)
IT	-0.00846	-0.00846	-0.0218***	0.00458	0.00458	-0.0188***	0.00887	0.00887	-0.0186***
	(0.0141)	(0.0656)	(0.00101)	(0.0105)	(0.0646)	(0.000753)	(0.0118)	(0.0641)	(0.000684)
ICT	0.00105	0.00105	-0.00125***	0.00297***	0.00297	-0.000778***	-0.000597	-0.000597	-0.00140***
	(0.00119)	(0.00445)	(5.20e-05)	(0.000709)	(0.00557)	(3.68e-05)	(0.00113)	(0.00486)	(4.97e-05)
TRD	0.00328	0.00328	0.000906***	0.00255	0.00255	0.000532***	0.00202	0.00202	0.000903***
	(0.00222)	(0.0101)	(7.71e-05)	(0.00219)	(0.0101)	(6.95e-05)	(0.00180)	(0.0102)	(7.79e-05)
CONSTANT	8.048***	8.048	-0.621***	6.953***	6.953*	-0.331***	7.295***	7.295***	-0.0271
	(2.632)	(9.627)	(0.0858)	(0.582)	(3.722)	(0.0792)	(0.404)	(2.753)	(0.0587)
F-Stats	0.000	0.000		0.000	0.000		0.000	0.000	
Wald Test			0.000			0.000			0.000
AR(2)			0.8009			0.8925			0.9127
Hansen Test			0.2145			0.6587			0.9415
R-squared	0.022			0.022			0.023		
Observations	540.0	540.0	540.0	540.0	540.0	540.0	540.0	540.0	540.0
Number of id	27.00	27.00	27.00	27.00	27.00	27.00	27.00	27.00	27.00

Statistical significance is denoted by ***, **, and * at 1, 5, and 10 percent. Standard error in parenthesis. This table reported the regression results of the impact of human capital on economic progress. The study used three proxies to human capital development such as no of students enrolled in primary level education (S_PRIMARY), secondary level education (S_SECONDARY) and territory level education (S_TERRITORY). Whereas, control variables includes financial development (FD), industry (IND), international tourism (ITOUR), information, communication and technology (ICT) and trade(TRD). The study tested the impact of each proxies via three regression analysis techniques such as DK, FGLS and system GMM. Source:

Own estimates.

Table 15 Model estimates for middle income countries

VARIABLES	l_gdp_15	l_gdp_15	l_gdp_15	l_gdp_15	l_gdp_15	l_gdp_15	l_gdp_15	l_gdp_15	l_gdp_15
L.EG			0.393**			1.170***			3.301***

			(0.181)			(0.166)			(1.049)
HC	1.675***	1.675	2.092***						
	(0.0807)	(1.238)	(0.633)						
GOV_EE				0.0986***	-0.0986	0.0245			
				(0.0199)	(0.108)	(0.0191)			
LIFE_EXP							0.163***	0.163***	0.0912**
							(0.0228)	(0.0193)	(0.0420)
FD	-0.00238	-0.00238	-0.00497**	0.00647	0.00647	0.00143	0.0153	0.0153	-0.0227*
	(0.00198)	(0.0199)	(0.00195)	(0.00639)	(0.0187)	(0.00304)	(0.0115)	(0.0153)	(0.0125)
IND	0.0383***	0.0383	0.0178	-0.0292*	-0.0292	-0.0419	-0.107**	-0.107**	-0.199**
	(0.00380)	(0.0716)	(0.0188)	(0.0140)	(0.0590)	(0.0335)	(0.0428)	(0.0484)	(0.0995)
ITOUR	0.0140***	0.0140	-0.0550	-0.00276	-0.00276	-0.00575	-0.0177	-0.0177	-0.207**
	(0.00461)	(0.0549)	(0.0377)	(0.0142)	(0.0538)	(0.0206)	(0.0270)	(0.0439)	(0.0853)
ICT	0.00312***	0.00312	0.000711	0.00301*	0.00301	-0.00360*	0.000531	0.000531	-0.0143**
	(0.000286)	(0.00405)	(0.00108)	(0.00147)	(0.00421)	(0.00197)	(0.00246)	(0.00319)	(0.00616)
TRD	0.00143	0.00143	-0.00746	0.00238	0.00238	-0.00137	0.0110**	0.0110	-0.0215**
	(0.00107)	(0.00934)	(0.00474)	(0.00228)	(0.00954)	(0.00282)	(0.00427)	(0.00723)	(0.00963)
CONSTANT	1.837***	1.837	0	8.800***	8.800***	0	21.40***	21.40***	0
	(0.301)	(4.818)	(0)	(0.441)	(2.239)	(0)	(2.667)	(2.263)	(0)
F-Stats	0.000	0.000		0.000	0.000		0.000	0.000	
Wald Test			0.000			0.000			0.000
AR(2)			0.32231248			0.98308295			0.64267175
Hansen Test			0.3847365			0.93818008			0.3987871
R-squared	0.300								
Observations	140	140	140	140	140	140	140	140	140
Number of id	7	7	7	7	7	7	7	7	7

Notes. Statistical significance is denoted by ***, **, and * at 1, 5, and 10 percent. Standard error in parenthesis. This table reported the regression results of the impact of human capital on economic progress. The study used gross domestic product(GDP).The study used three proxies to human capital development such as human capital(HC), government expenditure on education(GOV_EE) and life expectancy(LIFE_EXP). Whereas, control variables includes financial development (FD), industry (IND), international tourism (ITOUR), information, communication and technology (ICT) and trade(TRD). The study tested the impact of each proxies via three regression analysis techniques such as DK, FGLS and system GMM.

Source: Own estimates.

Table 16 Model estimates for schooling effects for middle income countries

	l_gdp_15	l_gdp_15				l_gdp_15	l_gdp_15	l_gdp_15	l_gdp_15
L.EG			1.254***			3.109***			1.288***
			(0.107)			(1.137)			(0.346)
S_PRIMARY	0.00426	0.00426	0.00495						
	(0.0352)	(0.0920)	(0.00413)						
S_SECONDARY				0.0130***	0.0130	0.0130			
				(0.00285)	(0.0180)	(0.00911)			
S_TERTIARY							0.0143***	0.0143	0.00429
							(0.00279)	(0.0144)	(0.0122)
FD	0.00726	0.00726	0.00591*	0.00189	0.00189	5.91e-05	0.00566	0.00566	0.00939
	(0.00718)	(0.0187)	(0.00307)	(0.00488)	(0.0201)	(0.00342)	(0.00616)	(0.0187)	(0.00966)
IND	-0.0205	-0.0205	-0.0393**	0.00317	0.00317	-0.229*	0.0125	0.0125	-0.0172
	(0.0244)	(0.0669)	(0.0184)	(0.0182)	(0.0656)	(0.131)	(0.0134)	(0.0660)	(0.0954)
IT	-0.00302	-0.00302	-0.0596***	0.0107	0.0107	-0.367**	0.0144	0.0144	-0.0716
	(0.0162)	(0.0577)	(0.0200)	(0.0122)	(0.0567)	(0.178)	(0.0141)	(0.0563)	(0.0516)
ICT	0.00159	0.00159	-0.00477***	0.00372***	0.00372	-0.0266*	-0.000120	-0.000120	-0.00536**
	(0.00148)	(0.00392)	(0.00166)	(0.000829)	(0.00490)	(0.0137)	(0.00143)	(0.00427)	(0.00234)
TRD	0.00566**	0.00566	-0.00636**	0.00482*	0.00482	-0.0300**	0.00432*	0.00432	-0.0111
	(0.00249)	(0.00888)	(0.00283)	(0.00239)	(0.00892)	(0.0150)	(0.00226)	(0.00893)	(0.00676)
CONSTANT	7.420**	7.420	0.17226582	5.910***	5.910*	0.95741221	6.384***	6.384***	0.50872877
	(3.206)	(8.473)	0.98070629	(0.740)	(3.270)	0.55481214	(0.449)	(2.416)	0.67541375
F-Stats	0.000	0.000		0.000	0.000		0.000	0.000	
Wald Test			0.000			0.000			0.000

AR(2)			0.32231248			0.98308295			0.64267175
Hansen Test			0.3847365			0.93818008			0.3987871
R-squared	0.29								
Observations	140	140	140	140	140	140	140	140	140
Number of id	7	7	7	7	7	7	7	7	7

Notes. Statistical significance is denoted by ***, **, and * at 1, 5, and 10 percent. Standard error in parenthesis. This table reported the regression results of the impact of human capital on economic progress. The study used three proxies to human capital development such as no of students enrolled in primary level education (S_PRIMARY), secondary level education (S_SECONDARY) and territory level education (S_TERRITORY). Whereas, control variables includes financial development (FD), industry (IND), international tourism (ITOUR), information, communication and technology (ICT) and trade(TRD). The study tested the impact of each proxies via three regression analysis techniques such as DK, FGLS and system GMM.

Source: Own estimates.

5.2.6 Comparison of human capital impact on economic growth across Balkans and EU

The impact of human capital on economic development is a well-established concept in economic theory. However, the extent to which human capital affects economic growth may vary across different countries and regions. Keeping in view the results obtained from modelling (see Table 17), human capital has a greater impact on economic development in less developed region of Europe like Balkan Region than developed Balkan Region of European Union in European economies.

Table 17 Summary of the findings

	Human Capital development	
Sub-region	Human capital development a) Human capital b) Govt Expenditure on education c) Life Expectancy	Quality of Education a) Primary Education b) Secondary Education c) Territory Education
EU	Weak positive impact of human capital on economic growth	Strong positive impact of quality education on economic growth
EU high income	Weak positive impact of human capital on economic growth	Strong positive impact of quality education on economic growth
EU middle income	Strong positive impact of human capital on economic growth	Weak positive impact of quality education on economic growth
EU Balkan	Weak positive impact of human capital on economic growth	Weak positive impact of quality education on economic growth
Non-Eu Balkan	Strong positive impact of human capital on economic growth	Weak positive impact of quality education on economic growth

Source: Author's own.

This study's main conclusions are that human capital has a stronger positive impact on economic growth in middle income European countries than in high income European countries. The results are in line with theoretic assumption that middle-income European nations may have more space for improvement in the development of their human capital than high-income countries, who may have already made significant investments in their healthcare and education systems. Therefore, compared to high income European nations, high expenditures in human capital development may have a greater effect on economic growth in middle income European countries. Secondly, middle income European countries may face greater challenges related to brain drain, where highly skilled workers emigrate to higher paying jobs in other countries. By investing in human capital development, middle income European countries may be able to retain and attract highly skilled workers, which can have a positive impact on economic growth. Thirdly, middle income European countries may be more reliant on human capital-intensive industries, such as technology and services, compared to high income European countries that may have a larger share of their economy focused on capital-intensive industries, such as manufacturing. Therefore, investments in human capital development may have a greater impact on economic growth in middle income European countries that rely more heavily on human capital-intensive industries.

However, the human capital proxies like primary, and secondary education have greater positive impact on economic growth in high income European countries vis-à-vis middle-income European countries except tertiary education. The quality of education is one possible explanation why human capital proxies related with education have a greater impact on economic growth in high income European countries than in middle income European countries. High-income countries have stronger education systems, with more resources, higher teacher salaries, and better infrastructure. Higher levels of human capital development and higher-quality education may result from this. Moreover, high-income countries tend to have more advanced economies that require more specialized skills and knowledge. The education system in these countries may be better equipped to provide the necessary education and training to meet the demands of these specialized jobs, which can lead to a more efficient workforce and higher levels of productivity. Considering the above results, the role of primary school enrolment becomes a more reliable and significant factor for sustainable economic growth in developing economies.

Similarly, keeping in view the comparison of Non- EU Balkan Region versus EU- Balkan Region, human capital has a greater impact on economic development in less developed region

of Europe like Balkan Region than developed Balkan Region of European Union in European economies. There are several reasons why this may be the case.

Firstly, less developed region of Europe tends to have lower levels of human capital compared to developed European economies. Human capital is the stock of knowledge, skills, and abilities embodied in people that can be used to produce economic value. In less developed countries of Europe, access to education and training is often limited, resulting in a lower stock of human capital. As a result, investments in human capital in these countries can have a greater impact on economic development than in developed European economies where the stock of human capital is already high. Secondly, the quality of human capital in less developed countries of Europe is often lower than in developed European economies. Even if the stock of human capital is the same, the quality of education and training can differ substantially across countries. In less developed countries of Europe, the education system may not be equipped to produce high-quality human capital. Therefore, investments in improving the quality of education and training can have a greater impact on economic development in these countries.

Finally, less developed countries of Europe may have more room for improvement in terms of human capital. Human capital is a cumulative process, and investments made today can have long-term effects on economic growth. In less developed countries of Europe, where the stock and quality of human capital are lower, investments in human capital can have a greater impact on economic development over the long run. Overall, the findings of this research suggest that human capital has a greater impact on economic development in less developed countries of Europe than in developed European economies due to differences in the stock, quality, and potential for improvement of human capital. These findings highlight the importance of investing in human capital in less developed countries of Europe to support long-term economic growth and development.

Keeping in view the comparative analysis of Non- EU Balkan Region versus European Union (EU), the findings suggest that the impact of human capital proxies on economic growth varies across different regions, specifically it varies within the Balkan Region. According to this study, human capital proxies such as human capital index, government expenditure on education, and life expectancy have a greater positive impact on economic growth in non-European Union Balkan countries than in European Union countries. On the other hand, human capital proxies such as School_Primary, School_Secondary, and School_Tertiary have a greater positive impact

on economic growth in European Union countries than in non-European Union Balkan countries.

One possible explanation for this difference is the level of economic development and institutional quality in the two regions. The European Union countries are generally more developed and have better institutional quality than the non-European Union Balkan countries. As a result, investments in education on all three levels may have a greater impact on economic growth in the European Union countries, as the institutions are better equipped to take advantage of the human capital generated by these investments. In contrast, the non-European Union Balkan countries are still in the early stages of economic development and have weaker institutional quality. In such a context, the impact of human capital proxies such as human capital index, govt expenditure on education, and life expectancy on economic growth may be greater, as they can provide a foundation for future economic growth.

Secondly, this difference related to the impact human capital has on economic growth could be related to the nature of the human capital proxies. For instance, the School_Primary, School_Secondary, and School_Tertiary proxies may be more relevant in the European Union countries, where there is a greater emphasis on formal education and training. In contrast, the human capital index, govt expenditure on education, and life expectancy proxies may be more relevant in the non-European Union Balkan countries, where the focus may be more on basic healthcare and acquiring basic skills.

In nutshell, the findings suggest that the impact of human capital proxies on economic growth varies across different country groups. The results highlight the importance of considering regional differences when designing policies aimed at promoting economic growth through investments in human capital. Policymakers should take into account the institutional quality, level of economic development, and nature of the human capital proxies in the region when making decisions about investments in education, healthcare, and other forms of human capital.

CONCLUSION

The study focused on analyzing the relationship between human capital and economic development in Europe, considering 33 European countries from 2000 to 2019. The European region was chosen as the sample due to its progress in addressing educational, economic, and political challenges, which can provide valuable insights for developing countries. The research aimed to explore the importance and structure of human capital and its integration with economic development, emphasizing the need for long-term growth policies.

The study emphasized the significance of regional analysis within Europe dividing the sample among European Union countries, and Europe Union Balkan Region and Non-European Union Balkan Region. Out of 33 countries, 6 countries belong to Non-European Union Balkan Region, 24 countries are included in European Union Countries, and 10 countries belong to Europe and Balkan Region. Given the breadth of this issue, the current research focuses on the regional dimension of economic and human capital in Europe and its lessons for economic policy to provide better insights to policymakers, as economic growth is influenced by geographical diversification and regional disparities. The European Union's focus on regional-level policies for sustainable economic growth was highlighted, as well as the existence of significant differences in GDP per capita across regions. The cultural and linguistic diversity of regions was also noted as possibly impactful factor to consider. Nevertheless, the core of the research was aimed at establishing the relation between human capital development and economic growth with the goal to showcase the differences between EU member states and to draw some insights for the Balkan Region- specifically for those countries of the region which are not yet in the EU.

To understand the variations in development levels, the study utilized the International Monetary Fund's classification, dividing the countries into high-income and middle-income groups. The classification helped highlight the different needs and challenges faced by these countries in organizing their human capital to foster economic growth. Overall, the research provided insights into the relationship between human capital and economic development, specifically at the regional level in Europe. It also offers some advice for policymakers and emphasizes the need to invest in human capital, improve education and health, and address regional disparities to achieve economic growth. In this way the findings of this study contribute to the broader understanding of the importance of human capital in driving economic success in different contexts.

This study emphasizes the importance of rigorous testing in econometric analysis to ensure the validity and reliability of the obtained results. It proposes a stepwise testing framework for econometric models, including fixed effect, random effect, Hausman test, and dynamic models, and robustness checks. The study recognizes the usefulness of static and dynamic panel estimation models in analyzing panel data, taking into account both cross-sectional and time-series dimensions. It also justifies the adoption of Driscoll-Kraay standard errors, feasible generalized least squares (FGLS), and System Generalized Method of Moments (GMM) as alternative estimation techniques to address violations of regression assumptions in panel data analysis.

The research highlights the limitations of static models and the need to consider alternative approaches when assumptions are violated. Diagnostic tests such as Modified Wald, Wooldridge, Jarque–Bera, and Pesaran CD tests are applied to identify issues such as heteroscedasticity, autocorrelation, non-normality, and cross-sectional dependence in the data. The study concludes that the OLS, random effect, and fixed effect models serve as initial steps for data analysis but may not be suitable for capturing the complex relationships in panel data.

Ultimately, the study proceeds with the Driscoll-Karay standard errors, FGLS, and System GMM as robust and efficient estimation techniques that address the limitations of static models and provide more accurate parameter estimates. By using these methods, the study was able to overcome issues related to heteroscedasticity, serial correlation, endogeneity, unobserved heterogeneity, and simultaneity bias. In this way, the research contributes to the understanding of the relationship between human capital and economic development while accounting for the complexities inherent in panel data analysis.

In the first phase, this study investigated the association of between human capital and economic progress in the full sample (Europe) using six proxies for human capital: human capital index itself, government expenditure on education, life expectancy, and school enrollment ratios at primary, secondary, and tertiary levels. The regression analysis provided strong evidence supporting the hypothesis that human capital has a significant positive impact on economic development in Europe. The findings were consistent with human capital theory, which emphasizes the importance of education and training in developing human skills and abilities, leading to increased productivity and economic growth. The study also aligned with

previous research that highlighted the constructive role of human capital in shaping economic growth.

The regression coefficients for human capital, government expenditure on education, and life expectancy were all statistically significant, indicating their positive impact on economic growth. Similarly, all three levels of education—primary, secondary, and tertiary—were found to have a significant positive relationship with economic development. The results supported endogenous growth theory, which emphasizes the role of education and innovation in driving economic growth. Investments in education and research and development were shown to foster technological progress and innovation, leading to sustained economic growth over time.

It was observed that human capital proxies like human capital index and life expectancy had a greater impact on economic growth in Europe compared to proxies like schooling levels and government expenditure on education. Possible reasons for this included the direct and comprehensive effects of health and standard of living on economic growth, as well as the relevance of life expectancy and healthcare spending in the European context.

Overall, this study provided empirical evidence supporting the positive relationship between human capital and economic development in Europe. The findings emphasized the importance of investing in education, health, and overall human capital to foster sustained economic growth and productivity in the region. However, it is important to consider other factors such as economic development level, institutional quality, and macroeconomic policies, which may influence the impact of human capital proxies on economic growth. Therefore, after those initial findings the analysis was extend towards regional and income-wise divisions of the sample.

In second phase, this study examined the link between human capital and economic development in the European Union countries only subsample. The findings reveal the significant impact of human capital, education, and health on economic development in European Union economies. Human capital and life expectancy have a positive influence, while government expenditure on education has a negative effect.

In the third step, the analysis of the Non-European Union Balkan region revealed that human capital index, government expenditure on education, and life expectancy have all positive impact on economic development. Human capital, as measured by proxy 1 (human capital index), shows a significant positive effect on economic development, aligning with the human capital theory. Government expenditure on education (proxy 2) also positively influences economic development, emphasizing the importance of public investment in education.

Similarly, life expectancy (proxy 3) has a positive relationship with economic development, as healthier individuals are more productive. The results highlight the significance of education and health in enhancing workforce skills, productivity, and overall economic growth. The findings also confirm the relationship between human capital proxies related to education (School_Primary, School_Secondary, and School_Tertiary) and economic development, emphasizing the importance of increasing enrollment in primary, secondary, and tertiary education. Several studies support the positive association between human capital and economic growth, indicating that investment in education guarantees sustainable economic development. However, there are inconsistencies in the findings from previous studies. In this sense this research contributes uniform and consistently repeatable pattern of positive association of all selected measures of human capital vs economic growth given by GDP.

In the fourth step, the study compared the impact of human capital on economic development in high- and middle-income European countries. It found that middle income countries benefited more from increasing investments in human capital, as they had greater room for improvement (or less human capital available from the start). Middle income countries also relied more on human capital-intensive industries. However, in high income countries, proxies related to education had a greater positive impact on economic growth, likely due to better quality education and specialized skills needed in advanced economies. Primary school enrollment was identified as a significant factor for economic growth in developing economies, while high-income countries benefited more from tertiary education.

Moreover, the findings reveal that human capital has a greater impact on economic development in less developed regions of Europe, like the Balkan Region, compared to developed European economies. Limited access to education and lower quality of human capital in less developed countries contribute to this disparity. Additionally, less developed countries have more room for improvement in human capital, making investments in education crucial for long-term economic growth. These findings emphasize the significance of investing in human capital in less developed European regions to foster sustainable economic development.

The impact of human capital proxies on economic growth varies between the Balkan Region and European Union countries. Non-EU Balkan countries benefit more from proxies like Human Capital Index, Govt Expenditure on Education, and Life Expectancy, while EU countries benefit more from School_Primary, School_Secondary, and School_Tertiary proxies. This difference may be attributed to varying levels of economic development, institutional

quality, and the nature of human capital proxies. Policymakers should consider those regional differences when investing in education and healthcare to promote economic growth effectively.

Keeping in view the above discussion, the initial hypotheses 1-8 related the role of human capital in shaping economic development could be accepted for Balkan Region based research as conducted in this study. However, the overall acceptance of the initial hypotheses has to be taken with caution as the "strength" of hypothesis fulfillment varies across level of development and regions. The details are presented in Table 18 and subsequent discussion.

Table 18 Summary of Hypotheses Testing

No	Hypothesis	Decision
H1	Based on human capital theory, the human capital is positively associated with economic growth in the Balkan Region	Accepted
H2	Based on human capital theory, the government expenditure on education is positively associated with economic growth in the Balkan Region	Accepted
H3	Based on human capital theory, the life expectancy is positively associated with economic growth in the Balkan Region	Accepted
H4	Based on human capital theory, the quality of education (No of students enrolled in primary, secondary and territory) is positively associated with economic growth in the Balkan Region	Accepted
H5	The impact of human capital on economic growth is stronger in Non- EU Balkan Region than EU- Balkan Region	Accepted
H6	The impact of government expenditure on education is stronger in Non- EU Balkan Region than in the EU- Balkan Region	Accepted for primary and secondary, rejected for tertiary
H7	The impact of life expectancy on economic growth is stronger in the Non- EU Balkan Region than in the EU- Balkan Region	Accepted
H8	Based on human capital theory, the quality of education (No of students enrolled in primary, secondary and tertiary education) is positively associated with economic growth in the Balkan Region	Accepted

Source: Author's work.

The findings of this study have several important managerial implications for Europe, the European Union, and the Non-European Union Balkan Region:

i. Investment in human capital: the study underscores the significance of investing in human capital, including education, health, and overall workforce skills. Policymakers in Europe should prioritize allocating resources to education and training programs, improving healthcare systems, and promoting lifelong learning initiatives. This investment will enhance the productivity, wages, and employment opportunities of the workforce, leading to sustainable economic growth.

ii. Addressing regional disparities: the study highlights the existence of significant regional disparities in economic development across Europe. Policymakers need to implement targeted regional development policies that focus on improving access to education, healthcare, and economic opportunities in less developed regions, particularly in the Non-European Union Balkan Region. By reducing regional disparities, countries can ensure more inclusive and balanced economic growth.

iii. Enhancing primary education: the study emphasizes the crucial role of primary education in driving sustainable economic growth, especially in developing economies. Policymakers should prioritize initiatives to increase primary school enrollment rates and improve the quality of primary education. By laying a strong foundation of basic skills and knowledge, countries can build a skilled workforce that contributes to long-term economic development.

iv. Strengthening tertiary education: in high-income countries, the study highlights the greater positive impact of tertiary education on economic growth. Policymakers should focus on enhancing the quality and relevance of tertiary education programs, ensuring they align with the demands of advanced economies. By equipping individuals with specialized skills and knowledge, countries can foster innovation, research, and development, which are key drivers of economic growth in high-income settings.

v. Collaboration and knowledge sharing: the study emphasizes the importance of collaboration and knowledge sharing among European countries. Policymakers should facilitate exchanges of best practices, lessons learned, and innovative policies in the areas of education, healthcare, and human capital development. By learning from each other's successes and challenges, countries can accelerate their own progress and optimize the utilization of resources.

vi. Policy coherence and integration: the study highlights the need for policy coherence and integration across different sectors, such as education, health, and economic development. Policymakers should adopt a holistic approach that ensures alignment between these sectors and promotes synergy. Coordinated policies will maximize the impact of investments in human capital and create an enabling environment for sustainable economic growth.

In summary, the managerial implications derived from this study emphasize the importance of investing in human capital, addressing regional disparities, enhancing primary and tertiary education, promoting collaboration and knowledge sharing, and ensuring policy coherence and integration. By implementing these recommendations, policymakers in Europe, the European Union, and the Non-European Union Balkan Region can effectively leverage human capital to drive economic development, improve living standards, and foster long-term prosperity.

Apart from the reliability and relevance of this study, some limitations have to be mentioned:

i. Generalizability: the study focuses specifically on Europe, analyzing the relationship between human capital and economic development in this region. Therefore, the findings may not be directly applicable to other regions or continents. Different socio-economic contexts, cultural factors, and institutional frameworks in other parts of the world may yield different results. However, it must be also stressed that the goal of the study was to specifically look for European context in view of the accession challenge for the remaining non-EU Balkan countries. As such the geographic, social and cultural setting of Europe had to be chosen.

ii. Data limitations: the study relies on available data for the selected European countries from 2000 to 2019. The quality and consistency of data across countries may vary, potentially introducing measurement errors or biases. Additionally, the study's reliance on secondary data limits the researchers' control over data collection methods, potentially leading to omitted variables or inaccuracies. In order to alleviate this problem, the very reliable source of World Bank and IMF as well as official Eurostat datasets were used.

iii. Proxy variables: the study utilizes proxy variables to measure human capital, such as education indicators (school enrollment ratios) and health indicators (life expectancy). While these proxies are commonly used in research, they may not capture the full complexity and multidimensionality of human capital. Other aspects, such as skills,

knowledge, and innovation, are not fully captured by the selected proxies, limiting the comprehensive understanding of human capital's impact on economic development. Human capital is a concept which is variedly defined in the literature thus besides going for broadly accepted proxies also a direct composite measure of human capital was selected following IMF understanding of this factor. However, it must be stressed that while IMF proposal is valid and frequently used in research it is not the only possible indicator of human capital that exists.

iv. Causality and endogeneity: the study establishes an association between human capital and economic development but does not claim to establish perfect causality. The relationship between these variables is complex and bidirectional, as economic development can also influence investments in human capital. The study may be subject to endogeneity issues, where the relationship between human capital and economic development is influenced by unobserved factors or reverse causality.

v. Omitted variables: while the study considers several important factors, such as government expenditure on education and life expectancy, there may be other variables that influence the relationship between human capital and economic development but are not included in the analysis. Factors like institutional quality, governance, infrastructure, and macroeconomic policies are reported by specific literature sources and can play a significant role but are not explicitly accounted for in this study. The rule of thumb for this study was to use the measures which are very frequently cited in contemporary economics (e.g. in majority of studies conducted over past 20 years).

vi. External factors: the study primarily focuses on the role of human capital in economic development while assuming that other external factors remain constant. However, economic development is influenced by various external factors such as globalization, technological advancements, trade policies, and political stability. These factors, which are not fully accounted for in the study, can significantly impact economic development independently of human capital. This is of course the usual case for economic models whereas certain uncontrollable variables are considered ceteris paribus.

vii. Policy implications: while the study provides valuable managerial implications, the effectiveness and feasibility of implementing these recommendations may vary across different countries and contexts. Policymakers need to consider the specific challenges, resources, and priorities of their respective regions when designing and implementing policies related to human capital and economic development.

While the present study has provided valuable insights into the relationship between human capital and economic development in Europe, there are several potential avenues for future research that can further enhance the understanding of this complex relationship. Addressing these areas of inquiry can contribute to the existing literature and provide policymakers with more nuanced guidance for promoting sustainable economic progress. Here are some potential avenues for future research.

i. Longitudinal analysis: This study primarily focused on panel data analysis, examining the relationship between human capital and economic development. Future research can adopt a longitudinal approach to analyze how changes in human capital indicators over time impact economic progress. Longitudinal analysis can provide valuable insights into the dynamics and causal relationships between human capital investments, policy interventions, and economic outcomes.
ii. Quality of education: while this study considered education indicators such as school enrollment ratios, future research can delve deeper into the quality of education and its impact on economic development. Investigating factors such as curriculum design, teaching methodologies, and educational outcomes can provide a more comprehensive understanding of how the quality of education influences human capital formation and economic progress.
iii. Technological advancement and innovation: human capital plays a crucial role in fostering technological advancement and innovation, which are key drivers of economic growth. Future research can explore the specific mechanisms through which human capital influences technological progress and innovation. Additionally, investigating the role of human capital in emerging sectors such as artificial intelligence, biotechnology, and renewable energy can shed light on the relationship between human capital and cutting-edge industries.
iv. Skills mismatch and labor market dynamics: human capital is not only about formal education but also encompasses skills and abilities relevant to the labor market. Future research can focus on understanding the dynamics of the labor market, the prevalence of skills mismatch, and the role of human capital in bridging the gap between labor supply and demand. Exploring the effectiveness of skill development programs, vocational training initiatives, and lifelong learning in addressing skills mismatch can provide valuable insights for policymakers.

v. Regional disparities and policy interventions: This study highlighted the existence of regional disparities in economic development within Europe. Future research can further investigate the factors contributing to these disparities and the effectiveness of policy interventions aimed at reducing them. Comparative studies analyzing successful regional development policies in whole worlds and other regions can provide valuable lessons for policymakers seeking to promote balanced economic growth across different regions.

vi. Human capital in developing countries: While this study focused on Europe, there is a need for research that examines the relationship between human capital and economic development in developing countries. These countries often face unique challenges such as limited access to education, healthcare, and resources. Investigating the impact of human capital investments, policy interventions, and institutional factors on economic progress in developing countries can provide valuable insights for policymakers in those contexts.

vii. Social and cultural factors: human capital is shaped not only by formal education but also by social and cultural factors. Future research can explore the influence of social and cultural dimensions on human capital formation and its subsequent impact on economic development. Factors such as social norms, gender equality, social capital, and cultural attitudes toward education and entrepreneurship can be investigated to understand their role in shaping human capital and economic progress.

viii. Multidimensional measurement of human capital: while this study utilized proxies such as education indicators and life expectancy to measure human capital, future research can explore alternative multidimensional measures of human capital. Composite indices that capture various dimensions of human capital, including skills, knowledge, health, and innovation, can provide a more comprehensive assessment of human capital's impact on economic development in order provide better insights to policy makers.

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APPENDIX – DATA DESCRIPTION

Table 19 Sample data series

S.No	Name	Category	Time Period
1	Albania	European Economies	2000-2019
2	Austria	European Economies	2000-2019
3	Belgium	European Economies	2000-2019
4	Bosnia and Herzegovina	European Economies	2000-2019
5	Bulgaria	European Economies	2000-2019
6	Croatia	European Economies	2000-2019
7	Cyprus	European Economies	2000-2019
8	Czech Republic	European Economies	2000-2019
9	Denmark	European Economies	2000-2019
10	Estonia	European Economies	2000-2019
11	Finland	European Economies	2000-2019
12	France	European Economies	2000-2019
13	Germany	European Economies	2000-2019
14	Greece	European Economies	2000-2019
15	Hungary	European Economies	2000-2019
16	Ireland	European Economies	2000-2019
17	Italy	European Economies	2000-2019
18	Latvia	European Economies	2000-2019
19	Lithuania	European Economies	2000-2019
20	Luxembourg	European Economies	2000-2019
21	Malta	European Economies	2000-2019
22	Montenegro	European Economies	2000-2019
23	Netherlands	European Economies	2000-2019
24	North Macedonia	European Economies	2000-2019
25	Poland	European Economies	2000-2019
26	Portugal	European Economies	2000-2019
27	Romania	European Economies	2000-2019
28	Serbia	European Economies	2000-2019
29	Slovak Republic	European Economies	2000-2019

30	Slovenia	European Economies	2000-2019
31	Spain	European Economies	2000-2019
32	Sweden	European Economies	2000-2019
33	Turkiye	European Economies	2000-2019

Source: Author's own.

Table 20 Sample – regional allocation

Panel A- Region-Wise Classification					
Name	Region	Name	Region	Name	Region
Austria	EU	Bulgaria	EU Balkan	Albania	Non_EU Balkan
Belgium	EU	Croatia	EU Balkan	Bosnia and Herzegovina	Non_EU Balkan
Cyprus	EU	Greece	EU Balkan	Montenegro	Non_EU Balkan
Czech Republic	EU	Romania	EU Balkan	North Macedonia	Non_EU Balkan
Denmark	EU	Slovenia	EU Balkan	Serbia	Non_EU Balkan
Estonia	EU			Turkiye	Non_EU Balkan
Finland	EU				
France	EU				
Germany	EU				
Hungary	EU				
Ireland	EU				
Italy	EU				
Latvia	EU				
Lithuania	EU				
Luxembourg	EU				
Malta	EU				
Netherlands	EU				
Poland	EU				
Portugal	EU				
Slovak Republic	EU				
Spain	EU				
Sweden	EU				

Source: Author's work.

Table 21 Sample – income based allocation

Panel A- Income-Wise Classification			
Name	Category	Name	Category
Austria	High Income	Albania	Middle Income
Belgium	High Income	Bosnia and Herzegovina	Middle Income
Croatia	High Income	Bulgaria	Middle Income
Cyprus	High Income	Montenegro	Middle Income
Czech Republic	High Income	North Macedonia	Middle Income
Denmark	High Income	Serbia	Middle Income
Estonia	High Income	Turkiye	Middle Income
Finland	High Income		
France	High Income		
Germany	High Income		
Greece	High Income		
Hungary	High Income		
Ireland	High Income		
Italy	High Income		
Latvia	High Income		
Lithuania	High Income		
Luxembourg	High Income		

Malta	High Income
Netherlands	High Income
Poland	High Income
Portugal	High Income
Romania	High Income
Slovak Republic	High Income
Slovenia	High Income
Spain	High Income
Sweden	High Income

Source: Author's work.

Table 22 Correlations matrix (Model 1)

l_gdp_15	1.00						
Hc	0.13***	1.00					
FD	0.13***	0.46***	1.00				
Ind	-0.12**	-0.34***	-0.22***	1.00			
IT	-0.11**	-0.22***	-0.30***	0.52***	1.00		
ict_mob	0.13**	0.46***	0.53***	-0.45***	0.27***	1.00	
TRD	0.13***	0.55***	0.54***	-0.56***	-0.17***	0.43***	1.00

Source: Own estimates.

Table 23 Correlations matrix (Model 2)

	l_gdp_15	gov_ee	FD	ind	IT	ict_mob	TRD
l_gdp_15	1.00						
gov_ee	0.02	1.00					
FD	0.13***	0.02	1.00				
Ind	0.12**	-0.07	-0.22***	1.00			
IT	0.11**	-0.02	-0.30***	0.52***	1.00		
ict_mob	0.13**	0.22***	0.53***	-0.45***	0.27***	1.00	
TRD	0.13***	-0.17***	0.54***	-0.56***	-0.17***	0.43***	1.00

Source: Own estimates.

Table 24 Correlations matrix (Model 3)

	l_gdp_15	life_exp	FD	ind	IT	ict_mob	TRD
l_gdp_15	1.00						
life_exp	0.54***	1.00					
FD	0.13***	0.42***	1.00				
Ind	-0.12**	-0.42***	-0.22***	1.00			
IT	-0.11**	-0.32***	-0.30***	0.52***	1.00		

ict_mob	0.13**	0.39***	0.53***	-0.45***	0.27***	1.00	
TRD	0.13***	0.42***	0.54***	-0.56***	-0.17***	0.43***	1.00

Source: Own estimates.

Table 25 Correlations matrix (Model 4)

	l_gdp_15	S_Primary	FD	ind	IT	ict_mob	TRD
l_gdp_15	1.00						
S_Primary	0.11**	1.00					
FD	0.13***	-0.52***	1.00				
Ind	-0.12**	0.57***	-0.22***	1.00			
IT	-0.11**	0.58***	-0.30***	0.52***	1.00		
ict_mob	0.13**	-0.60***	0.53***	-0.45***	0.27***	1.00	
TRD	0.13***	-0.59***	0.54***	-0.56***	-0.17***	0.43***	1.00

Source: Own estimates.

Table 26 Correlations matrix (Model 5)

	l_gdp_15	S_tertiary	FD	ind	IT	ict_mob	TRD
l_gdp_15	1.00						
S_tertiary	0.13***	1.00					
FD	0.13***	0.55***	1.00				
Ind	-0.12**	-0.62***	-0.22***	1.00			
IT	-0.11**	-0.61***	-0.30***	0.52***	1.00		
ict_mob	0.13**	0.47***	0.53***	-0.45***	0.27***	1.00	
TRD	0.13***	0.63***	0.54***	-0.56***	-0.17***	0.43***	1.00

Source: Own estimates.

Table 27 Correlations matrix (Model 6)

	l_gdp_15	S_tertiary	FD	ind	IT	ict_mob	TRD
l_gdp_15	1.00						
S_tertiary	0.13***	1.00					
FD	0.13***	0.56***	1.00				
Ind	-0.12**	-0.53***	-0.22***	1.00			
IT	-0.11**	-0.49***	-0.30***	0.52***	1.00		
ict_mob	0.13**	0.44***	0.53***	-0.45***	0.27***	1.00	
TRD	0.13***	0.53***	0.54***	-0.56***	-0.17***	0.43***	1.00

Source: Own estimates.

Table 28 Hausman Test result

Table 5			
Huasman Test	HC	Gov_ee	Life_exp
P Value	0.562776	0.532756	0.871996
Decision	Random	Random	Random
Table 6			
Huasman Test	S_Primary	S_Second	S_tertiary
P Value	0.500878559	0.044194949	0.267855242
Decision	Random	Fixed	Random
Table 7			
Huasman Test	HC	Gov_ee	Life_exp
P Value	0.005395944	0.701945357	0.008534381
Decision	Fixed	Random	Fixed
Table 8			
Huasman Test	S_Primary	S_Second	S_tertiary
P Value	0.525105369	0.601593018	0.6501309
Decision	Random	Random	Random

Table 9			
Huasman Test	HC	Gov_ee	Life_exp
P Value	0.021146992	0.009781199	0.002724007
Decision	Fixed	Fixed	Fixed

Table 10			
Huasman Test	S_Primary	S_Second	S_tertiary
P Value	0.333826604	0.976916851	0.557681158
Decision	Random	Random	Random

Table 11			
Huasman Test	HC	Gov_ee	Life_exp
P Value	0.235007578	0.630140993	0.954525388
Decision	Random	Random	Random

Table 12			
Huasman Test	S_Primary	S_Second	S_tertiary
P Value	0.640551016	0.043477422	0.618232154
Decision	Random	Fixed	Random

Table 13			
Huasman Test	HC	Gov_ee	Life_exp
P Value	0.689591347	0.600512205	0.364100041
Decision	Random	Random	Random

Table 14			
Huasman Test	S_Primary	S_Second	S_tertiary
P Value	0.458724153	0.875240552	0.281618388
Decision	Random	Random	Random

Table 15			
Huasman Test	HC	Gov_ee	Life_exp
P Value	0.399482863	0.599608854	0.750696622
Decision	Random	Random	Random

Table 16

Huasman Test	S_Primary	S_Second	S_tertiary
P Value	0.016872135	0.017134123	0.005701578
Decision	Fixed	Fixed	Fixed