THE IMPACT OF UNIVERSITY EDUCATION ON ECONOMIC DEVELOPMENT COUNTRIES

[a]TALYAT BELYALOV, [b]MARIAN TRIPAK, [c]YULIIA POPIL, [d]VERA ROMANOVA, [e]OKSANA VILCHYNSKA, [f]OLHA SERDIUK

[a]Department of Economics and Services, Kyiv National University of Technologies and Design, Kyiv, Ukraine, [b]Department of Finance and Economics, ERIHE "Kamianets-Podilsky state institute" (Podisky Special Education and Rehabilitation Socio-Economic College), Kamianets-Podilsky, Ukraine, [c]Department of Doctoral and Postgraduate Studies Management and Administration Department, Dnipropetrovsk State University of Internal Affairs, Dnipro, Ukraine, [d]Department of Social Work, Taras Shevchenko National University of Kyiv, Kyiv, Ukraine, [e]Department of Statistics, Ivan Franko National University of Lviv, Lviv, Ukraine, [f]Public Management and Administration Department, Poltava State Agrarian University, Poltava, Ukraine
email: [a]zaa_2006@ukr.net, [b]tmm.75@ukr.net, [c]ylyska_84@i.ua, [d]iam@romanovavera.com, [e]oksana.vilchynska@lnu.edu.ua, [f]olga.serdiuk@pdaa.edu.ua

Abstract: Governments around the world have noted the importance of educating and training professionals with different skills, expanding education and inclusion, especially at the tertiary level. Among the main reasons is the need to ensure economic growth through improving the skills and quality of human capital. Higher education is seen as a source of innovation, provides increased levels of productivity and economic growth. The aim of the article was to identify the level of economic impact of university education in low-income countries. The article used methods of statistical analysis, correlation analysis, regression analysis to identify a linear relationship between indicators of economic growth CAR, Nigeria and indicators of university education for the years 1980-2020.

Keywords: University Education, Education and Economic Growth, Human Capital and Growth, Low-Income Countries

1 Introduction

The governments of various countries of the world are focused on the importance of education and the formation of professionals with different skills, the expansion of education and inclusion, especially at the tertiary level. Among the main reasons is the need to ensure economic growth by increasing the qualification and quality of human capital. Higher education is regarded as a source of innovation that ensures an increase in the level of labor productivity and economic growth. Moreover, the policy of expansion and accessibility of higher education for all segments of the population is often considered to be a decent public policy through its potential impact on economic growth (Hanushek, 2016). Higher education provides essential benefits and advantages for the population, particularly through the potential for career growth, higher income levels, knowledge and skills. For this and a number of other reasons, the governments of the countries are pushing for an expansion of education through its potential impact on productivity and economic growth. Economic growth depends on the capital knowledge of the country. However, measuring the capital of knowledge using mathematical or natural science tests to assess the success of students does not have a direct impact on economic growth (Hanushek, 2016). The increase in the number of years of study at universities also does not significantly affect the growth of the country (Hanushek, 2016). The structure of specialization of higher education (engineers, electrical engineers, mechanics, etc.) and investment of the country and the population in education are important changes. At the same time, a higher level of skills of students ensures a higher level of economic impact of the university education. The aim of this article is to identify the level of economic impact of university education in low-income countries.

2 Literature review

In the late 1980s and early 1990s, macroeconomists turned to attempts to explain differences in growth rates around the world. A variety of different questions occupied a large part of the theoretical analysis of growth, which developed with the revival of empirical growth analysis. For example, the issue of whether growth should be modeled in terms of income growth rates, or whether it should be modeled in terms of income levels, has been addressed. Early growth models of the economy depending on various factors are usually identified as endogenous growth models (Lucas, 1988; Romer, 1990), while later growth models are usually considered neoclassical growth models (Mankiw et al., 1992). The two different perspectives have substantially different implications for long-term growth and economic income. From the human capital perspective, the focus of research is on how an increase in the quality of human capital provides an increase in income, but does not provide a change in the stationary rate of growth in the neoclassical model. On the other hand, an increase in the quality of human capital in the endogenous growth model would lead to an increase in the long-run growth rate. Theoretical differences have received considerable theoretical attention, although relatively few empirical studies have attempted to provide evidence for a particular form of dependence (Benhabib & Spiegel, 1994; Hanushek & Woessmann, 2016; Holmes, 2013). However, the differences between theoretical approaches to assessing the impact of human capital on countries' economies are not fundamental, whereas measuring the quality of human capital is fundamental. While there are significant differences in how skills affect economies, little of the large body of theoretical work has focused on measuring relevant skills.

This article argues that the issue of measurement-especially when we consider the role of higher education-becomes central to any empirical considerations of the human capital-growth nexus. The historical development of modeling and measuring human capital provides an important basis for understanding the development of contemporary empirical analysis of growth. The importance of workforce skills has entered into one of the oldest economic analyses, and the history of research helps explain a number of issues concerning modern analysis of economic growth. For example, William Petty (Petty & Graunt, 1899), an early economist in public finance, evaluated the economics of war and immigration in terms of the skills (and wages) of individuals. Adam Smith (Smith, 2019) introduced the ideas of different skills of the workers who take a win in the labor market in "The Wealth of Nations," although other notions of specialization of labor outweighed his notions of human capital. Alfred Marshall (Mincer, 1970), however, believed that the concept of human capital lacked empirical correlation, in part because of serious measurement problems. After the collapse of more than half-systematic and influential works of Theodore Schultz (1961), Gary Becker (2009), and Jacob Mincer (1970), and others have developed a century the concept of human capital. Their research gave rise to a rapid growth of both theoretical and empirical application of the concept of human capital to a wide range of issues. The contribution of Jacob Mincer (1970) was particularly important in empirical research on the significance of human capital in economics. The central criticism of the early ideas of human capital was that human capital was an essentially unlovable concept, which lacked ideal indicators of measurement. By confirming that the difference in wages, for example, was caused by a difference in qualification or human capital, we can assume that the measurement of human capital can be made at the expense of stipulated differences in wages, a completely tautological assertion. Jacob Mincer (1970) in a simple, but elegant model reconsidered the individual investment model. He asserted that the main motivation for schooling is to develop the general skills of individuals, and that individuals can be viewed on the basis of a measure of school attendance hours in order to invest in skills that will eventually pay off in the labor market. Therefore, there was an idea to measure human capital by the amount of schooling that individuals received. Jacob Mincer (1970), based on statistical analysis, showed that differences in wages could be explained by school success and, in a more subtle way, by investment in on-the-job training (Mincer, 1970). This notion was universally

accepted and dictated the empirical approach of most empirical analyses in labor economics until today. It is important that success at school was something that was often measured in censuses and inventories, supporting the empirical analysis of scientists. For example, the Mincer wage function has become a general model for wage determination and has been established in more than 100 individual countries (Psacharopoulos & Patrinos, 2004). The desire to expand university education is based on the argument of economic growth due to the increase in the number of graduates. However, empirical studies have shown that an increase in the number of years of education without an increase in the level of cognitive skills has little impact on the economic growth of the country, The difference in cognitive skills (knowledge capital) explains the different rates of economic growth in different countries (Hanushek, 2016; Niessen et al., 2018).

A number of studies on countries with high, medium and low income have shown a positive effect of human capital on the level of economic growth (Qadri & Waheed, 2013; Kruss et al, 2015; Zhu & Li, 2017; Siddiqui & Rehman, 2017; Ogundari & Awokuse, 2018; Ali et al., 2021; Matousek & Tzeremes, 2021). However, there are no studies on the impact of university education on economic growth, and the studies are mainly based on data on primary and secondary education. A review of the literature based on 283 data from various studies revealed a link between the low level of income of citizens, low socio-economic status and the low level of education in most cases (Bulman, Eden & Nguyen, 2017).

3 Materials and research methods

This article uses methods of statistical analysis based on indicators of average value, standard deviation, dilution, minimum and maximum, correlation analysis, regression analysis to show the relationship between the indicators of economic growth CAR, Germany and indicators of university education. World Bank data were used for the years 1980-2020 for both countries, which were available in the database. The dependent variables are GDP per capita growth (annual %), GDP growth (annual %), GDP per capita (constant 2010 US $); the independent variables are School enrollment, tertiary (gross), gender parity index (GPI), School enrollment, tertiary (% gross), School enrollment, tertiary, male (% gross), School enrollment, tertiary, female (% gross), Pupil-teacher ratio, tertiary. The study countries were selected based on the availability of data for low-income countries. The main limitation of the study was the lack of data for comparison for other low-income countries.

4 Results

The World Bank classifies CAR and Nigeria as low-income countries. In CAR, the annual GDP growth rate averaged 1.154% in 1980-2020 with a deviation of 7.323%. In 2020 the GDP growth rate was -1.75%. Per capita GDP averaged $ 450.346 in 1980-2020, down $ 185 from 1980 ($ 562) to 2020 ($ 377). School enrollment, tertiary enrollment was 1.89%, particularly for males 2.951% and females 0.733%, indicating that fewer females are enrolled in tertiary education. The latter trend is also indicated by the gender parity index (GPI) CAR, which averaged 0.224. In addition, the CAR shows nervousness in taking into account women's HEIs. The mean value of the Pupil-teacher ratio CAR was 17 with a deviation of 10 (see Table 1).

Table 1: Descriptive Statistics of Change: Central African Republic 1980-2020

	GDP per capita growth (annual %)	GDP growth (annual %)	GDP per capita (constant 2010 US$)	School enrollment, tertiary (gross), gender parity index (GPI)	School enrollment, tertiary (% gross)	School enrollment, tertiary, male (% gross)	School enrollment, tertiary, female (% gross)	Pupil-teacher ratio, tertiary
Mean	-0,840	1,154	450,346	0,224	1,890	2,951	0,733	17,137
Standard error	1,118	1,144	9,851	0,017	0,115	0,128	0,080	1,629
Median	1,319	3,600	438,456	0,187	1,563	2,694	0,554	17,773
Standard deviation	7,160	7,323	63,080	0,106	0,739	0,820	0,511	10,429
Excess	15,112	17,129	-0,801	-1,226	-1,268	-1,315	-1,321	-1,541
Asymmetry	-3,299	-3,537	0,051	0,472	0,542	0,220	0,637	0,334
Interval	43,536	45,874	228,325	0,377	2,252	2,726	1,480	30,735
Minimum	-36,557	-36,392	334,441	0,062	0,885	1,638	0,121	3,872
Maximum	6,979	9,482	562,766	0,439	3,137	4,364	1,601	34,607
Account	41	41	41	41	41	41	41	41

Source: author's based on World Bank (2021b)

In Nigeria, the average value of GDP growth rates in 1980-2020 was 3.055% with a deviation of 5.388%, and GDP per capita – $ 1784 with a deviation of $ 441. GDP per capita grew by $ 224 from 1980 ($ 2,049) to 2020 ($ 2,273), while the value of gender parity index (GPI) is significantly higher compared to CAR – 0.589 for 1980-2020. For example, the index was 7.07, particularly for men – 8.809 and women – 5.523. There are 19 students per 1 HEIs teacher in Nigeria on average, while there are 17 students in CAR (see Table 2).

Table 2: Descriptive Statistics of Change: Nigeria 1980-2020

	GDP per capita growth (annual %)	GDP growth (annual %)	GDP per capita (constant 2010 US$)	School enrollment, tertiary (gross), gender parity index (GPI)	School enrollment, tertiary (% gross)	School enrollment, tertiary, male (% gross)	School enrollment, tertiary, female (% gross)	Pupil-teacher ratio, tertiary
Mean	0,423	3,055	1784,724	0,589	7,070	8,809	5,523	19,135

Standard error	0,819	0,841	68,910	0,023	0,468	0,442	0,426	0,891
Median	1,278	4,196	1598,820	0,687	7,920	9,176	6,627	16,214
Standard deviation	5,245	5,388	441,241	0,150	2,996	2,832	2,729	5,707
Excess	2,079	2,000	-1,422	-1,066	-1,659	-1,907	-1,772	-0,273
Asymmetry	-0,863	-0,857	0,487	-0,701	-0,254	-0,075	-0,186	0,770
Interval	27,908	28,457	1233,110	0,457	8,649	7,259	6,900	22,556
Minimum	-15,450	-13,128	1317,360	0,324	1,842	4,999	1,771	12,271
Maximum	12,457	15,329	2550,470	0,782	10,491	12,258	8,671	34,826
Account	41	41	41	41	41	41	41	41

Source: author's based on World Bank (2021a).

A correlation analysis of economic growth data and university education indicators for the Central African Republic (Table 3) made it possible to reveal a direct linear relationship between the growth rate of GDP per capita (%) and the gender parity index of enrollment in higher education (0, 11). There is a low correlation between GDP per capita at 2010 prices and the index of gender parity for enrollment in higher education (coefficient -0, 58), involvement to higher education (-0,61), especially of men (-0,64) and women (-0,58), ratio of students to teachers (-0,61) (see Table 3).

Table 3: The correlation of Change: Central African Republic 1980-2020

	GDP per capita growth (annual %)	GDP growth (annual %)	GDP per capita (constant 2010 US$)	School enrollment, tertiary (gross), gender parity index (GPI)	School enrollment, tertiary (% gross)	School enrollment, tertiary, male (% gross)	School enrollment, tertiary, female (% gross)	Pupil-teacher ratio, tertiary
GDP per capita growth (annual %)	1,00							
GDP growth (annual %)	0,99	1,00						
GDP per capita (constant 2010 US$)	0,19	0,23	1,00					
School enrollment, tertiary (gross), gender parity index (GPI)	0,11	0,02	-0,58	1,00				
School enrollment, tertiary (% gross)	0,05	-0,04	-0,61	0,92	1,00			
School enrollment, tertiary, male (% gross)	0,05	-0,04	-0,64	0,87	0,97	1,00		
School enrollment, tertiary, female (% gross)	0,07	-0,01	-0,58	0,97	0,98	0,94	1,00	
Pupil-teacher ratio, tertiary	0,08	-0,01	-0,61	0,95	0,96	0,93	0,96	1,00

Source: author's based on World Bank (2021b).

The correlation analysis of the data of economic growth and indicators of higher education for Nigeria (Table 4) shows a low direct linear relationship between the growth rate of GDP per capita (%) and the gender parity index in higher education (0, 44), enrollment in institutions of higher education (0,49), especially of men (0,44) and women (0,43), ratio of students to teachers (0,33). There is a direct correlation between the rate of GDP growth on the indicators of university education, between GDP per capita and indicators of university education (see Table 4).

Table 4: The correlation of changes: Germany 1980-2020

	GDP per capita growth (annual %)	GDP growth (annual %)	GDP per capita (constant 2010 US$)	School enrollment, tertiary (gross), gender parity index (GPI)	School enrollment, tertiary (% gross)	School enrollment, tertiary, male (% gross)	School enrollment, tertiary, female (% gross)	Pupil-teacher ratio, tertiary
GDP per capita growth (annual %)	1,00							
GDP growth (annual %)	1,00	1,00						
GDP per capita (constant 2010 US$)	0,14	0,15	1,00					
School enrollment, tertiary (gross), gender parity index (GPI)	0,44	0,44	0,60	1,00				
School enrollment, tertiary (% gross)	0,49	0,49	0,73	0,92	1,00			
School enrollment, tertiary, male (% gross)	0,44	0,44	0,77	0,87	0,99	1,00		
School enrollment, tertiary, female (% gross)	0,43	0,43	0,77	0,93	0,99	0,98	1,00	
Pupil-teacher ratio, tertiary	0,33	0,34	0,70	0,66	0,78	0,79	0,80	1,00

Source: author's based on World Bank (2021a).

Thus, while the Central African Republic shows a negative correlation between GDP per capita, in Nigeria there is a direct linear relationship. This can be explained by the fact that in CAR the average value of GDP per capita growth (annual %) was

observed in 1980-2020, while in Nigeria the value of GDP per capita growth (annual %) was additional in 1980-2020. The constructed graphs of the linear relationship between GDP per capita and enrollment in higher education institutions in CAR and Nigeria also indicate a positive link between the variables for CAR, a direct linear link for Nigeria (see Fig. 1-2).

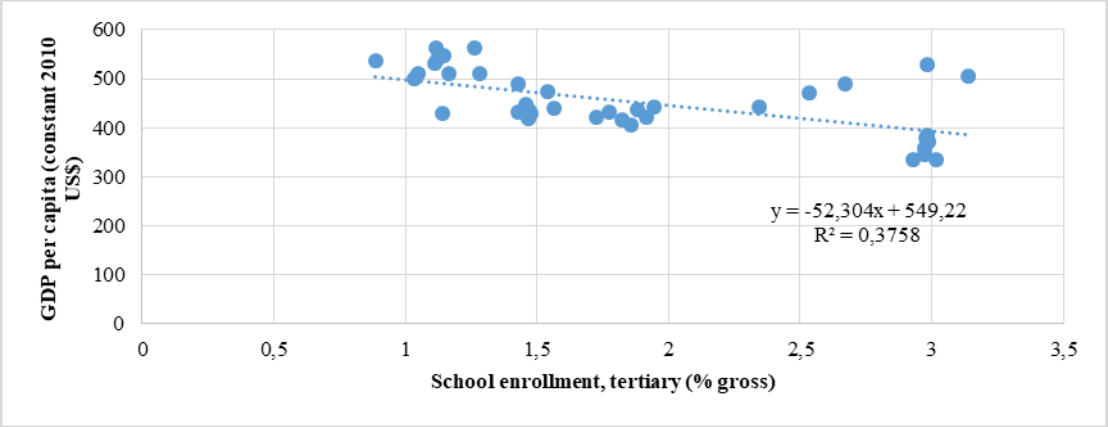

Figure 1 – Linearity between school enrollment, tertiary (% gross) and GDP per capita (constant 2010 US $) in CAR
Source: author's based on World Bank (2021b).

The coefficient of determinacy of the CAR dependence ratio is 0.3758, which indicates that enrollment in institutions of higher education explains 37.58% of the growth of GDP per capita CAR. For comparison, enrollment in institutions of higher education explains 52.67% of GDP per capita growth in Nigeria.

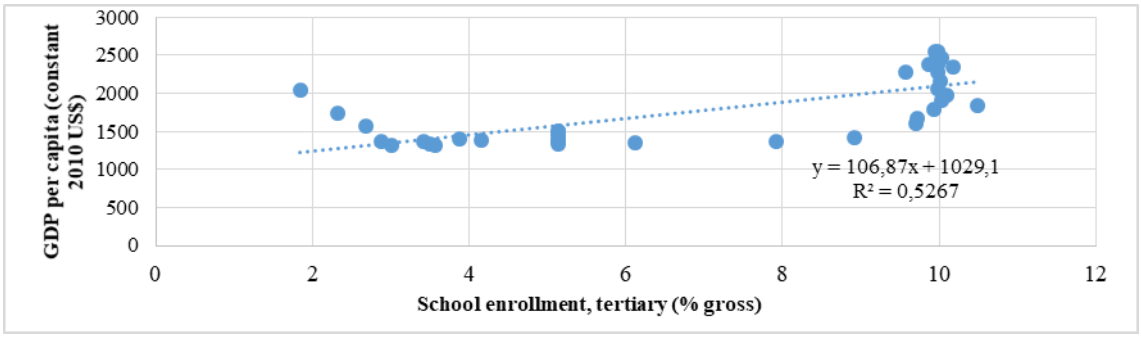

Figure 2 – Linear relationship between school enrollment, tertiary (% gross) and GDP per capita (constant 2010 US $) in Nigeria
Source: author's based on World Bank (2021a)

5 Discussion

Higher education slipped down the international development agenda in the past 25 years as first the education for all goals and then the millennium development goals focused on primary education, at the same time as the overall global development discourse put little emphasis on issues of industry-led growth, technological progress and innovation. Yet since the millennium, governments and populations in the South have largely accepted the discourse of the global knowledge economy and higher education enrolment growth has been phenomenal, with some national systems in Africa expanding more than ten-fold since 2000. Nonetheless, the absence of external support to higher education had a major negative effect on research capacity on education for development in Africa, whilst Northern scholars also largely evacuated the field due to parallel declines in funding. Slowly, research activity on higher education and development is beginning to rebuild internationally. Significantly, our analysis of the two cases stresses the importance of the intersection between the global, national, sectoral and spatial dimensions when thinking about the connection between education and economic development. It shows how these vary considerably and how dynamics at multiple scalar levels work in complex ways to shape possibilities for development. Higher education institutions contribute to economic development, focusing on the evolutionary economy and the approach of national innovation systems.

This gives a different advantage in the conceptual role of higher education development through a focus on the importance of education, skills, labor, innovation and production for economic development. (Kruss et al., 2015). The study by Qadri & Waheed (2013) reveals a correlation between the potential for higher income levels in countries with a low level of income for the conditions of investment in human capital (higher education, among others). Ali et al. (2021) based on a regression analysis of panel data in a sample of 12 low-income countries for 1980-2016, found a correlation between economic growth and human capital. Zhu & Li (2017) found that high-income countries have a higher level of complexity than low- and middle-income countries. The empirical findings of Zhu & Li (2017) reflect the positive impact of economic complexity and different levels of human capital on long- and short-term growth. At the same time, secondary education as an indicator of the level of human capital development has a comparatively greater positive direct effect and a much stronger interactive effect on economic growth. Ogundari & Awokuse (2018) used panel data from 35 African countries to find a positive impact of education as a measure of human capital on economic growth, although the health contribution is comparatively greater than the impact of education.

The study by Siddiqui & Rehman (2017) revealed the dependence of economic growth in the countries of North Asia on primary and secondary education. At the same time, the level of higher and vocational education has a greater positive impact

on economic growth in Central Asia. Siddiqui & Rehman (2017) also reported a positive effect of government spending on education on economic growth in North and East Asia. The differences in the rates of growth in North and East Asia are related to the differences in the progress of education in the regions. This study also revealed a correlation between economic growth and higher education, while in CAR a low HEIs enrollment rate is negatively correlated with GDP per capita, in Nigeria a slight increase in HEIs enrollment rate is positively linearly related to GDP per capita.

6 Conclusion

In CAR the annual GDP growth rate averaged 1.154% over 1980-2020, per capita GDP averaged $ 450.346 over 1980-2020, a decrease of $ 185 since 1980. School enrollment, tertiary CAR was 1.89%, particularly for males 2.951% and females 0.733%, indicating that fewer women are enrolled in higher education. In Nigeria, GDP growth averaged 3.055% at a margin of 5.388% over 1980-2020, and per capita GDP was $ 1,784 at a margin of $ 441, with per capita GDP increasing by $ 224 from 1980. The growth rate was 7.07, particularly for men – 8.809 and women – 5.523. GDP per capita CAR is negatively correlated with HEIs, while GDP per capita in Nigeria is directly correlated with HEIs.

Further research should be directed to the identification of the link between the skills of the population of low-income countries and economic growth.

Literature:

1. Ali, M., Raza, S. A. A., Puah, C. H., & Samdani, S. (2021). How financial development and economic growth influence human capital in low-income countries. *International Journal of Social Economics*. Vol. ahead-of-print No. ahead-of-print. https://doi.org/10.1108/IJSE-05-2020-0323
2. Becker, G. S. (2009). Human capital: A theoretical and empirical analysis, with special reference to education. University of Chicago press.
3. Benhabib, J., & Spiegel, M. M. (1994). The role of human capital in economic development evidence from aggregate cross-country data. Journal of Monetary economics, 34(2), 143-173.
4. Bulman, D., Eden, M., & Nguyen, H. (2017). Transitioning from low-income growth to high-income growth: is there a middle-income trap?. *Journal of the Asia Pacific Economy*, *22*(1), 5-28.
5. Hanushek, E. A. (2016). Will more higher education improve economic growth?. *Oxford Review of Economic Policy*, *32*(4), 538-552. http://hanushek.stanford.edu/sites/default/files/publications/Hanushek%202016%20Oxf%20Rev%20Econ%20Policy%2032(4).pdf
6. Hanushek, E. A., Machin, S. J., & Woessmann, L. (Eds.). (2016). Handbook of the economics of education. Elsevier.
7. Kruss, G., McGrath, S., Petersen, I. H., & Gastrow, M. (2015). Higher education and economic development: The importance of building technological capabilities. *International Journal of Educational Development*, *43*, 22-31.
8. Lim, S. S., Updike, R. L., Kaldjian, A. S., Barber, R. M., Cowling, K., York, H., ... & Murray, C. J. (2018). Measuring human capital: a systematic analysis of 195 countries and territories, 1990–2016. *The Lancet*, *392*(10154), 1217-1234.
9. Lucas Jr, R. E. (1988). On the mechanics of economic development. Journal of monetary economics, 22(1), 3-42.
10. Mankiw, N. G., Romer, D., & Weil, D. N. (1992). A contribution to the empirics of economic growth. The quarterly journal of economics, 107(2), 407-437.
11. Matousek, R., & Tzeremes, N. G. (2021). The asymmetric impact of human capital on economic growth. *Empirical Economics*, *60*(3), 1309-1334.
12. Mincer, J. (1970). The distribution of labor incomes: a survey with special reference to the human capital approach. Journal of economic literature, 8(1), 1-26.
13. Niessen, L. W., Mohan, D., Akuoku, J. K., Mirelman, A. J., Ahmed, S., Koehlmoos, T. P., ... & Peters, D. H. (2018). Tackling socioeconomic inequalities and non-communicable diseases in low-income and middle-income countries under the Sustainable Development agenda. *The Lancet*, *391*(10134), 2036-2046.
14. Ogundari, K., & Awokuse, T. (2018). Human capital contribution to economic growth in Sub-Saharan Africa: does health status matter more than education?. *Economic Analysis and Policy*, *58*, 131-140. https://doi.org/10.1016/j.eap.2018.02.001
15. Petty, W., & Graunt, J. (1899). The Economic Writings of Sir William Petty (Vol. 1). The University Press. Psacharopoulos, G., & Patrinos*, H. A. (2004). Returns to investment in education: a further update. Education economics, 12(2), 111-134.
16. Qadri, F. S., & Waheed, A. (2013). Human capital and economic growth: Cross-country evidence from low-, middle- and high-income countries. Progress in Development Studies, 13(2), 89-104. https://doi.org/10.1177%2F1464993412466503
17. Romer, P. M. (1990). Endogenous technological change. Journal of political Economy, 98(5, Part 2), S71-S102.
18. Schultz, T. W. (1961). Investment in human capital. The American economic review, 51(1), 1-17.
19. Siddiqui, A., & Rehman, A. U. (2017). The human capital and economic growth nexus: in East and South Asia. *Applied Economics*, *49*(28), 2697-2710. https://doi.org/10.1080/00036846.2016.1245841
20. Smith, A. (2019). An Inquiry into the Nature and Causes of the Wealth of Nations (No. 1, pp. 1-2). Liberty Classics,.
21. World Bank (2021a). Nigeria data. https://data.worldbank.org/country/nigeria
22. World Bank (2021b). Central African Republic data. https://data.worldbank.org/country/central-african-republic
23. Zhu, S., & Li, R. (2017). Economic complexity, human capital and economic growth: empirical research based on cross-country panel data. *Applied Economics*, *49*(38), 3815-3828. https://doi.org/10.1080/00036846.2016.1270413

Primary Paper Section: A

Secondary Paper Section: AM