The Problem of Human Capital and Economic Growth in the Democratic Republic of the Congo Through the Analysis of Statistical Data

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ABSTRACT: This paper aims to detect the interactions between human capital in its educational dimension and economic growth in the Democratic Republic of Congo over a period of thirty-one years, from 1980 to 2011, using a vector autoregressive model. The non-adaptability of students to occupations, the mismatch between sectors with high employability and fields that graduate students, the low funding of education by the state and the very low creative capacity of learners at the primary level remain challenges. Thus, the results showed a positive but small impact of the variables of gross secondary school enrollment rate, physical capital investment rate, and the worker-total population ratio. On the other hand, the impact was very considerable with public spending on education and population growth, and an impact

KEYWORDS: human capital; economic growth; education; per capita growth; education financing

I. INTRODUCTION

The objective of this paper is to test the relationship between human capital and economic growth in the Democratic Republic of Congo in order to propose the best strategies applicable to human capital for a good economic performance of the country. Indeed, human capital is understood in terms of knowledge, skills, qualifications and other qualities of an individual that promote personal, social and economic well-being. Moreover, it is a set of skills, knowledge and qualifications that the individual possesses either by genetic transmission or by acquisition along the life journey. This being the case, in order for an individual to obtain all these elements, a sacrifice in terms of costs must be made in the hope of generating satisfactory returns in the future. It is therefore a question of investment and this explains why this stock of knowledge is called capital. In the eyes of companies wishing to hire, education is qualified as a signal and a trigger for increasing the productivity of workers and, in turn, leads to an increase in productivity. In order to make the following clear, we have made the observation that the DRC is full of a myriad of intellectuals, who are produced annually by higher education and university establishments belonging either to the State or to the private sector. A second observation is that these Congolese intellectuals are hit by unemployment which is explained, for some, by the inadequacy between the fields abundantly filled with jobs and the fields of qualification of these intellectuals while for the others, unemployment is explained by the deprivation of qualifications and competences sought by the employers thus putting in danger their employability. It goes without saying that the majority of Congolese intellectuals produced by Congolese universities belong to the social science fields, including literature, political and administrative sciences, economics, law, medicine and psychology, and that most small and medium-sized enterprises belonging to Congolese people work in the service sector, such as customs agencies, accounting and legal auditing firms, security agencies, real estate agencies, personnel training and recruitment, and trade (clothing and food stores). As for the industrial sector, it is the prerogative of expatriates and offers a plurality of jobs to nationals whose salaries are modest while expatriate workers of these same companies enjoy colossal salaries; hence a considerable salary disparity Fixing a look at the figures of Congolese human capital, it is noticeable that the human capital index of the DRC in 2018 and 2019 was established at 0.37 below the average of sub-Saharan African countries being at 0.40. This simply means that a person born in the DRC today will only achieve 37% of his or her productive potential as an adult because he or she has not benefited from a complete education and optimal health conditions (Annuaire statistique de la RDC, 2020) and 43% of children in the DRC are affected by a qualitative deficit in food that is malnutrition and this is a huge handicap to the development of intellectual capacities, creative skills, abilities and ingenuity of children and even of the adult population. In addition, education spending doubled in real terms between 2005 and 2012 and reached 13% of the budget in 2012, or 1.8% of gross domestic product. However, compared to other African and even developing countries, this figure is significantly low. In addition, public spending on education was 15% below the average of the comparator countries, whose figure is 22%. Analyzing this expenditure by level of education, it was found that in 2012, primary education absorbed 43% of current expenditure, secondary 27% and higher 29%. Pre-school and informal education are almost completely excluded, as they only received a very modest share of current expenditure, less than 1% in 2012. Public unit costs per student are among the lowest in sub-Saharan Africa, since in 2012, for

example, they amounted to 18,500 CFA francs, or 4.8% of GDP per capita, for primary education, 37500 CFA francs, or 9.8% of GDP per capita, and 350,000 CFA francs, or 91.2% of GDP per capita, for higher education, compared to anaverage of 9%, 23% and 284% for some sub-Saharan African countries.It will be noted that in the DRC, households contribute 77% of current education expenditures at the primary and secondary levels through a variety of costs, the most important of which are school fees. These expenditures were estimated at 16% of GDP per capita in 2012 at the primary level and 32% at the secondary level and these levels are three times higher than the public unit costs per student. For the African DevelopmentBank, investment in human capital contributes to the direct improvement of people's well-being and indirectly to the strengthening of the various forms of human capital that contribute to income growth. Consequently, the development

1.1 Review of the Literature

The debates and doctrinal positions related to the contribution of the human capital in the economicgrowth are legion and strewn with some controversies. Different authors have expressed their considerations regarding this relationship, taking into account the specific realities of their investigations. The idea that education contributes to growth constitutes both the origin and the outcome of the human capital theory. In one of the founding texts, Theodore Schultz observes that education explains most of the total factor productivity, that portion of growth that neither physical capital nor the volume of labor can explain (Schultz, 1966). Macroeconomic models estimated by accounting and then econometric methods take as their starting point the introduction of human capital into an aggregate production function, in the same way as physical capital or the quantity of labour (Aghion & Howitz, 1988). According to Aghion and Howitz, two approaches can be distinguished in terms of education: in the first analysis, Robert Lucas indicates that there are two sources of human capital accumulation: education and learning by doing. In Lucas's logic, therefore, the level of production is a function of the stock of human capital insofar as human capital is incorporated like physical capital and labor. Lucas' analysis gives education and training a central importance in the

Production process. The only way to increase the level of production sustainably and cumulatively is to increase the quantity of human factors, i.e. skilled labor. The model therefore envisages a division of time between production activities, education and training (Lucas, 1988). As a result, the increase in human capital results in a high level of production. Learning by doing" is an important component of production. In Lucas' vision, education is at the heart of the production process, hence the need to invest more in education and training. He takes up the analysis of Garry Becker, for whom growth is essentially determined by the accumulation of human capital (in terms of flows). In Becker's logic, the accumulation of human capital involves the study of an intertemporal choice made by individuals. In other words, the individual determines the amount of his investments that he must make in order to maximize his future gain or his intertemporal utility. Education is thus understood by Becker as an investment to which it is appropriate to associate a life span, a capacity and a risk. In this theoretical analysis, Becker draws several lessons (Becker, 1964). On the one hand, he formalizes educational choices as rational choices of optimizing agents, who compare the length of their life cycle, the present value of the gains to be expected from education and the costs incurred (Boccanfuso, et al, 2009); on the other hand, the analysis implicitly raises the question of the methods of financing investments in human capital and the determinants of the rate of return on this investment. It could be argued that human capital is similar to physical capital in terms of investment choices. According to Becker, there is "a strong causal relationship between improvements in education or human capital and economic growth. Second, Nelson and Phelps prove that the stock of human capital is the main driver of growth, not the difference in rates: growth differences between countries are determined by differences in their stocks of human capital, and thus by their respective capacities to generate technical progress. The main practical difficulty concerns the measurement of human capital. Indeed, in order to introduce human capital as a factor of

2. FINANCING THE CONGOLESE EDUCATION SYSTEM

Congolese education is mostly financed by households, given their large shares compared to public educational contributions. Paradoxically, most developing countries (Sub-Saharan Africa, Asia, etc.) are characterized by very high proportions of public educational contributions and thus strengthen the contribution of human capital to economic growth. In addition, the Congolese education sector generally benefits from few resources in relation to the objectives assigned to it and is therefore one of the poor relations of this economy, given the limited funds allocated to it (Sumata, 2020).

2.1 Techniques Used

To capture the relationship between human capital and economic growth in the Democratic Republic of Congo, we adopt a vector autoregression model that requires, first, an analysis of stationarity through Dickey-Fuller and Phillips-Perron tests of the different series of the model. Once the series are made stationary, we proceed to the determination of the optimal lag and then to the estimation of themodel (Bourbonnais, 2009). At the end, a diagnosis will be made to the model before its validation.

-GDP per capita growth rate: this is the endogenous variable of the model. It reflects the economic performance or the evolution of a nation's production in relation to the number of inhabitants. It is the percentage change in GDP per capita as observed during the period under analysis and in the lightof the available data. This variable showed successively negative signs

over a ten-year period from 1990 to 2001 before showing positive figures at the beginning of the 2000s, precisely in 2004. The question is therefore to see to what extent per capita output has fluctuated during the years considered in the analysis. -Public expenditure on education as a percentage of GDP: these are the costs incurred by the government to support the education sector (operating expenses, civil servants'salaries, capital assets, etc.). The presence of this variable is explained by the fact that it has a direct impact on per capita growth and that any expenditure allocated to education leads to an increase in per capita production because the individual will have benefited from effective and sustained trainingthat will enable him to be more productive through his intellectual and innovative capacities. A positive sign is therefore expected between public spending and the growth rate of GDP per capita-Gross primary enrollment ratio: this translates the number of students enrolled in school, all ages combined, as a percentage of the school-age population in primary education, taking into account both private and public schools. This indicator is a measure of the intensity of the country's educational sphere, so a high rate means that a large proportion of the school-age population is in school and that there is only a small proportion of people outside the school system. A positive relationship is thus expected between the gross primary enrollment ratio and growth in GDP per capita. Secondary gross enrollmentratio: This indicates the number of students enrolled in school, all ages combined, as a percentage of the school-age population in the secondary education sphere. It is also expected to be a positive sign because the more a country has a high number of educated people while having a low portion of uneducated and unproductive people, the more they accumulate the knowledge and skills necessary for creativity, innovation and the absorption of new technologies which, corollary, end up improving productivity. -Investment rate in physical capital as a percentage of GDP: investment implies the sacrifice of a present consumption to increase a future production. Investment in physical capital reflects the acquisition of movable and immovable assets (land, buildings, premises, rolling stock, road construction, hospitals, other materials and equipment). A positive sign is expected between the rate of investment and GDP per capita growth because the more investment, the more total output and, in turn, per capita output increase. Improving the quality of infrastructure lowers costs and therefore provides incentives for demand and supply (Ekodo, 2018). We note that the data used in this article are from several sources including the World Bank, UNESCO and the statistical yearbooks of the ministries of the Democratic Republic of Congo (Plan, EPSP, ESURS). - Population growth rate: This can have a negative or positive impact on economic growth. The positive impact is reflected in an increase in demand through the population growth channel, which in turn is an incentive for investments that stimulate economic growth. In this regard, Esther Boserup explains this positive impact that men are supposed to provide for their adaptation to this population growth and believes that growth is a source of progress in agriculture and therefore of economic growth (Boserup, 1970). In contrast, the negative impact is manifested when the Gross Secondary Enrollment Ratio (GSER) indicates the number of students enrolled in secondary school at all ages as a percentage of the school-age population. It is also expected to be a positive sign because the more a country has a high number of educated people whilehaving a low portion of uneducated and unproductive people, the more they accumulate the knowledge and skills necessary for creativity, innovation and the absorption of new technologies, which in turn end up improving productivity. -Investment rate in physical capital as a percentage of GDP: investment implies the sacrifice of a present consumption to increase a future production. Investment in physical capital reflects the acquisition of movable and immovable assets (land, buildings, premises, rolling stock, road construction, hospitals, other materials and equipment). A positive sign is expected between the rate of investment and GDP per capita growth because the more investment, the more total output and, in turn, per capita output increase. Improving the quality of infrastructure lowers costs and thus provides incentives for demand and supply (Ekodo, 2018). 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Table N°1. Percentage contribution of households and the State in the unit cost of training (2012)

	Primary	secondary
Household	75	75
State	25	25
Total	100	100

Source: Report of the Ministry of Primary, Secondary and Professional Education; DRC, 2014

The table above shows that households account for a very large share of the unit cost of education,with a percentage of 75 percent, while the state's share is only slightly higher, at 25 percent.

Table N°2. Regional comparison in percentage of household and government contributions to theunit cost of training
Country/Year Primary Secondary1 Secondary2

	primary	secondary	Secondary 2
benin(2010)	51	50	54
Burundi (2011)	13	30	18
Cameroon (2010)	32	50	35
Comoros (2010)	32	35	40
Drc (2010)	77	77	77
Gambia (2010)	46	67	70
Guinea Bissau (2010)	34	62	62

Comparing with other sub-Saharan African countries, it can be observed that the Democratic Republicof Congo is the country that uses households the most to finance education with a percentage of 77, followed by Gambia, while Burundi records a low contribution from households explaining the strong involvement of the state in the education sector, followed by the Comoros Islands, Cameroon and Benin.

4. ECONOMETRIC ANALYSIS
This section is devoted to the analysis methodology, the presentation of the variables, the specification and the estimation of the model.

5. PRESENTATION OF VARIABLES
The capture and control of the relationship between human capital and economic growth in the DRC implies the presence of different variables including the endogenous variable and the exogenous variables. Indeed, the variable to be explained is economic growth, the proxy for which is the growth rate of gross domestic product per capita, while the explanatory variables are represented by the praxis such as public spending on education, the gross primary school enrolment ratio, the gross secondary school enrolment ratio, the investment rate, the worker-population ratio and the population growth rate.

6. RECOMMENDATION
Human capital in its educational dimension should have a lasting impact on economic growth under certain conditions, including the considerable allocation of resources to the education sector (increase in teaching salaries at all levels, reinforcement of school facilities such as computer rooms, laboratories, internet connections, quality libraries). Furthermore, studies at the primary, secondary and higher levels should be accompanied by regular practices so that learners are introduced to work and this will increase their employability and reduce unemployment. In another perspective, it is proposed to the Congolese government to put at the disposal of the pupils and students having shown strong performances and that meritoriously, scholarships which will enable them to increase their performances and their intellectual culpabilities. The government is also asked to adapt the educational streams to the technological evolution and to the characteristics and stakes of the whole Republic. Specifically, that a course of study in mining economics be opened in Congolese universities, given that the economy is largely fed by this sector. Furthermore, the Congolese government is asked to put in place a system of universal hiring through the organization of tests and not the promotion of nepotism and favoritism since these two factors are harmful to the increase of productivity and, moreover, to economic growth. On the demographic front, the government is asked to ensure that population growth is controlled by controlling the birth rate and rural exodus. The creation of schoolsand companies compatible with the size of the population is also We understood that the quantitative tools, today unavoidable in economic sciences, are of a great contribution in the evolution of this discipline. Economic problems are becoming more and more complex, the tools of analysis are becoming more and more complex, but the training program of the Congolese economist (Africa in general) does not keep pace: there is a gap. More concretely, a few years ago, the Laboratoire d'analyse-recherche en économie quantitative/Lareq (www.lareq.com) estimated that the Democratic Republic of Congo (DRC), if not Africa, was 40 years behind in macro-econometric modeling, based on Lucas' critique in the 1970s (1976). Are we not beyond 40 years in other areas? While waiting to answerthis question, the CER-3 has taken on the mission of reducing, if not filling, the gap in the training of Congolese economists in order to create an elite that meets international requirements. This is the meaning of the technical notes that we produce, which will be directly accessible online, in a dedicated site (under construction), by the time it is finished.

7. GROWTH MODELS
Several authors have sought to understand the mechanism of growth (its engines and effects), and the results of their research

have made it possible to identify explanatory factors and to construct theories or models of growth. These differ from one another, in particular, in their hypotheses (diminishing returns on capital or not, substitutable or complementary factors of production, endogenous or exogenous sources of growth, engines of growth, etc.), or in their capacity to explain certain stylized facts (economic convergence, poverty in developing countries, etc.). It emerges from various theories or models of growth that growth can be explained by exogenous factors (increase in the labour force, accumulation of capital per capita and technological innovation in all its forms), endogenous factors, or even factors that go beyond the classical production function (diversity or variety of products, trade, geography, history, inequalities and institutions). In pre-industrial theories, growth is explained by the progression of the labor force, i.e. by demography and societal changes. According to Thomas Malthus (1798), one of many, fertility has an impact on economic growth and constitutes a brake (offsets the technological shock) in the evolution of the standard of living per capita in the long term. Hence, it is important to limit births.

On the other hand, other economists explain growth by the accumulation of capital, we speak of the theories of the accumulation of productive capital in a closed economy. Let us begin with those (from the 1950s to the 1980s) who believe that growth is explained by exogenous factors. For R. Harrod (1939) and E. Domar (1946), known as the Harrod-Domar model, considered that stable or balanced growth required both full employment and a balance between savings and investment (the razor's edge); it also required an optimal combination of labour and capital factors, which were considered complementary. These authors believe that growth is not stable - or that the full employment equilibrium is a happy accident - because of the insufficiency of capital, and because it is not obvious to observe these equilibria (savings and employment equilibria). In other words, for Harrod and Domar, savings are the engine of growth, and policies to encourage savings or investment are advocated. Unlike these authors, R. Solow and T. Swan (1956), known as the Solow-Swan model, rejected the idea of a "razor's edge" and considered that markets are in equilibrium, factors of production are substitutable and each has a diminishing marginal return, but production has constant returns to scale. Solow-Swan estimate that - under the hypothesis of diminishing marginal returns to capital - the positive effects of savings on growth are transitory and eventually exhausted in the long run when the economy reaches steady state or equilibrium; at this level, GDP per capita depends on the savings rate, the population growth rate and the rate of capital depreciation. Thus, the profitability of capital is seen as the driving force of investment, not savings. Frank Ramsey (1928) is more concerned with the normative aspects (social objective) of the results obtained, by addressing the question of the optimal level of capital per capita, i.e. the optimal savings rate capable of maximizing consumption per capita in the long term. According to Ramsey (known as the Ramsey model), the optimal savings rate corresponds to the weight of capital in the production function; it is the golden rule that guarantees optimal growth trajectories. Saving policies must take the golden rule into account to be socially efficient. N.G. Mankiw, D. Romer and D. Weil (1992), after confronting the Solow-swan model with the facts, present "human capital" (investment) as a factor of growth as much as physical capital. The idea is that training (spending on education) improves the productive capacities of individuals. Taking human capital into account allowed these authors to empirically validate the Solow-Swan theses (economic convergence). Many other economists (around 1980-1990) think differently, arguing that

Population growth is not accompanied by social and economic policies aimed at reducing unemployment, education, health and increasing investment. It should therefore be noted that the impact is relative and depends on the socio-economic policies implemented and the evolution of the age structure of the population. - Worker-to-population ratio: This measures the proportion of the population in paid employment in the total population. In a given country, an increase in the number of workers triggers a decrease in the dependency ratio and thus leads to an increase in the level of savings needed for economic growth. A positive sign is therefore expected between the worker/population ratio and economic growth. A high unemployment rate can affect economic growth in a way determined by the nature and source of unemployment (Othmane & Mohamed, 2021). In addition to the above, the estimation of the relationship between education and economic growth is fraught with contradictions and these have highlighted the lack of precision in the indicators measuring human capital (Altinok, 2006)

Specification

For the analysis of the relationship between human capital and economic growth, we have drawn on a COBB-DOUGLASS type model in which production is a function of physical capital, labour and technological progress. Mankiw will later introduce human capital to this model and it will be presented as follows (Mankiw & all, 1992): $Y_t = F(A, K, H, L)$ where Y translates the rate of growth of the product per capita, A: technical progress, K: physical capital, H: human capital, L: labor. In logarithmic form, the model takes the following form: $\log Y_t = \log A + \alpha \log K + \beta \log L + (1-\alpha-\beta) \log H + U_t$ In view of the lessons provided by the review of theoretical and empirical literature and considering the particularities of the Congolese economy, we retained the following variables in our analysis model:GDP per capita growth rate(TCPIBT), gross primary school enrollment rate(TBSP),gross secondary school enrollment rate(TBSS),investment rate(TINV),public expenditure on education(DPED),population growth rate(TCPOP),workers/total population ratio(TRAVPOP).Hence, we retain a linear model such as: $TCPIBT = a_0 + a_1 TBSS + a_2 DPED + a_3 TINV + a_4 TRAVPOP + a_5 TBSP + a_6 TCPOP$

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Model Estimation

The table below shows that the series of the growth rate of the gross domestic product per capita, the gross secondary school enrolment rate, the public expenditure on education, the investment rate and the gross primary school enrolment rate are stationary in first difference and are therefore integrated of order one, i.e. I(1), whereas the series of the workers' ratio and the population growth rate are integrated of order two, i.e. I(2), since they are stationary in second difference. Thus, the application of vector error correction and autoregressive models with distributed or staggered lag are inefficient. Hence, the use of a vector autoregressive model is recommended, and the latter requires going through the steps from stationarity to the diagnostic study of the model.

Table N°3. Results of the unit root test for all the variables of the model

VARIABLES	ADF IN LEVEL	ADF IN FIRST DIFFERENCE	ADF IN SECOND DIFFERENCE
TCPIBT	-1.73	-4.96	
TBSS	-1.21	-4.91	
DPED	-1.82	-7.86	
TINV	-2.79	-6.12	
TRAVPOP	-1.30	-1.50	-5.11
TBSP	-0.59	-5.40	
TCPOP	-1.68	-3.20	-5.18

Source: Authors, based on results from eview software

-DETERMINATION

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-366. 5249	NA	77829.12	31.12707	31.21823	
1	-218.5817	197.2575*	24.58252*	22.88181*	25.63060*	23.61107*

The results in this table indicate that the number of lags that the model admits is 1 since the minimizing criterion is at the first lag (AKAIKE)**.**

Estimation of the VAR Model

TCPIBT = 0.601883031781*TCPIBT (-1) + 0.0198212892285*TBSS (-1) + 3.15278014923*DPED (-1) + 0.0161362107903*TINV (-1) + 0.0453268166762*TRAVPOP (-1) - 0.0175066516457*TBSP (-1) + 1.93560639045*TCPOP (-1) - 12.5757655514 Estimation of the equation for the growth rate of gross domestic product per capita reveals that the latter is positively impacted by the past values of the growth rate of GDP per capita, the gross secondary school enrolment rate, public education expenditure, the investment rate, the ratio of workers to total population, and the growth rate of

The population while the impact is negatively manifested by the gross primary school enrollment rate. TBSS = 0.580400447699*TCPIBT (-1) + 0.537727280392*TBSS (-1) + 0.92064602137*DPED (-1) + 0.0544287096676*TINV (-1) - 0.121745222855*TRAVPOP (-1) - 0.0890129057221*TBSP (-1) + 5.27218589821*TCPOP (-1) + 12.5732800492 The second equation shows the regression of the gross secondary school enrollment rate against the other variables in the model. It is thus revealed that the growth rate of GDP per capita, public expenditure on education, the investment rate, the population growth rate and the past value of the gross secondary school enrollment rate have a positive impact on the current gross enrollment rate. On the other hand, the variables that are the population-worker ratio and the gross primary enrollment ratio have a negative impact. DPED = 0.00421944189126*TCPIBT (-1) + 0.0100535204653*TBSS (-1) + 0.709485775394*DPED (-1) - 0.00993941125062*TINV (-1) - 0.0238840819276*TRAVPOP (-1) + 0.00137055793201*TBSP (-1) - 0.436138573771*TCPOP (-1) + 3.11670540816 It follows from this regression that the variables positively affecting public education expenditure are the growth rate of ¨GDP per capita, the gross secondary enrollment rate, the gross primary enrollment rate, and the lagged variable of public education expenditure while the physical capital investment rate, the worker-population ratio, and the population growth rate negatively impact the variable. TINV = 0.536103886326*TCPIBT (-1) - 0.286612962276*TBSS (-1) + 4.23383495517*DPED (-1) - 0.130679766002*TINV (-1) - 0.733493882832*TRAVPOP (-1) + 0.0636786486927*TBSP (-1) + 8.291453041*TCPOP (-1) + 38.1286712158 The physical capital investment rate is negatively impacted by the gross secondary

school enrollment rate, the worker-population ratio, and the lagged investment rate variable. On the other hand, the growth rate of GDP per capita, public expenditure on education,the gross primary school enrollment ratio and the population growth rate have a positive impact on the investment rate.

$$TRAVPOP = 0.00738449147136*TCPIBT\ (-1) - 0.0471363223909*TBSS\ (-1) - 0.136531887984*DPED\ (1)$$

$- 0.00622762181469*TINV\ (-1) + 0.940123041415*TRAVPOP\ (-1) - 0.00525374828678*TBSP\ (-1) -$

$0.0632723450951*TCPOP\ (-1) + 5.93891639065$ The worker-population ratio is negatively affected bythe gross secondary school enrollment rate, public expenditure on education, the investment rate, thegross primary school enrollment rate, and the population growth rate, while the growth rate of GDP per capita and the worker-population ratio positively affect the variable. $TBSP = 0.878461191075*TCPIBT\ (-1) + 0.691047611062*TBSS\ (-1) -$

$4.20394967384*DPED\ (-1) - 0.0820155831798*TINV\ (-1) - 2.89767715873*TRAVPOP\ (-\ 1) -$

$0.0506645874829*TBSP\ (-1) + 6.04863022048*TCPOP\ (-1) + 249.070918109$ From the above equation,

we can see a positive influence of the gross primary school enrollment rate from variables such as the growth rate of GDP per capita, the gross secondary school enrollment rate and the population growthrate, while the public expenditure on education, the investment rate, the worker-population ratio andthe lagged gross enrollment rate variable have a negative influence. $TCPOP = -0.00201801704319*TCPIBT\ (-1) +$

$0.00418862118903*TBSS\ (-1) + 0.201202004457*DPED\ (-1) - 0.0100895273686*TINV\ (-1) -$

$0.0405174501747*TRAVPOP\ (-1) - 0.0126335938899*TBSP\ (-1) + 1.08177579906*TCPOP\ (-1) +$

3.23847843896 Population growth is negatively impacted by the growth rate of GDP per capita, the investment rate, the worker-to-population ratio, and the primary gross enrollment ratio**,** while the secondary gross enrollment ratio and the past growth rate have a positive impact.

Have a positive impact.

Table N° 2: Important statistics for the equations of the estimated models

	TCPIBT	TBSS	DPED	TRAVPOP	TINV	TBSP	TCPOP
R-Square	0.79	0.88	0.92	0.98	0.53	0.95	0.91
RC-Aj	0.70	0.83	0.89	0.97	0.32	0.93	0.87
F-Cal	8.94	17.65	27.63	150.84	2.59	46.85	25.09

Source: Authors, based on eviews 9 software.

8. CONCLUSION

This article aims to capture the relationship between human capital, in its educational dimension, and economic growth in the Democratic Republic of Congo over a 31-year period from 1990 to 2020. To frame the study, we opted for a vector autoregressive model given the statistical characteristics that the variables presented. This said, the educational variables selected are the gross primary school enrollment rate, the gross secondary school enrollment rate and public expenditure on education. In addition to these variables, other variables such as the rate of investment in physical capital, the ratioof workers to total population and the rate of population growth were also included. After analyzing the results of the different regressions, we found that only the gross primary school enrollment rate did not match its expected sign, while the other variables in the model did. Thus, the gross secondaryschool enrolment rate, the physical investment rate and the ratio of workers to total population had apositive impact on per capita growth, but only slightly, since the coefficients were 1.9, 1.6 and 4.5 percent respectively. On the other hand, public expenditure on education explained the per capita growth at 315% while the population growth rate explained it at a percentage of 193. In view of the results found, it goes without saying that sustainable growth of GDP per capita in the DRC requires the implementation of effective educational and economic policies such as the promotion of multi-sectoral physical capital investments, the adaptation of education to the country's practices and challenges, the reorganization of primary education, an increase in public spending on education and the control of demographic growth. All things considered, our study has the particularity of capturing the incidenceof human capital in per capita growth by using three proxies simultaneously, including the gross enrolment ratio at the primary and secondary levels and public spending on education, and also of having captured the bidirectional aspect between economic growth and human capital. This study didnot capture the impact of the quality of education dimension in the model and this can be the workhorse for future studies that can integrate all dimensions of education using all proxies for the detection of the impact of human capital on per capita growth, in the context of the Democratic Republic of Congo and even in other countries. In the case of our country, studies that have addressedthe issue of human capital with three education proxies in the model have been rare.

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