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Impact of Public Spending on Human Capital on Benin's Economic Growth

Balogoun Ismaïla

Assistant Professor of Abomey-Calavi University-Calavi, Benin

Abstract: ***The objective of this study is to evaluate the effect of public spending on human capital on economic growth. It is the human capital production function of Barro (1996) that was inspired for the specification of the model of this work. The study covered the period from 1980 to 2014. The work took into account the variables related to health, those related to education, economic policy and phenomena beyond the actions of governments. Thus, we have included in the model GDP per capita, public expenditure on health per capita, life expectancy at birth, investment expenditure on health (in the absence of sufficient data on health infrastructure coverage). , gross primary and secondary enrollment rates, population growth rate, openness of the economy and average rainfall. As a result of our work, these variables account for 98% overall and significantly the variations in GDP per capita over the long term and 83% for the short term. From the results of our econometric estimations, it appears that: In the long term, an increase in public health expenditure of 1% will lead to an increase in the Gross Domestic Product of 0.17%, all else being equal. In the short term, the effect on economic growth of the same change (1%) in public health spending would be 1.07%. However, the short-term effect of these expenditures on GDP is not significant.***

Keyword: Impact, Human Capital, Growth, Benin

1. Introduction

In this world of interdependence of economies, most developing countries place primacy on internal dynamics to face the challenge of globalization and to spur industrial take-off. Therefore, one of the fundamental questions in development economics is to understand why some countries are poor while others are rich. The human capital argument is increasingly used to explain this duality. Indeed, its importance goes back to Adam Smith (1776) in the " Wealth of Nations ", a book in which the author raised the fact that investment in human capital made it possible to increase future productivity. He also affirmed the importance of the role of education and training as a determinant of individual productivity and income. In the second half of the 20th century, the work of Mincer (1958) Schultz (1961) and Becker (1964) dwelt on the importance of human capital and proposed a thorough theory of human capital.

It was Becker (1964) who really set the conceptual framework for the theory of human capital. To do this, it formalizes educational choices as rational choices of optimizing agents, who compare over the life cycle, the present value of the gains to be expected from education and the costs incurred.

It is with the persistence of the recession in the 1970s that the debate on growth takes on a new dimension, with the new theories of endogenous growth developed since the end of the 1980s (Lucas 1988, Barro 1989, Romer 1990). Benin, like other countries south of the Sahara, faces socio-economic difficulties marked by an unstable growth rate and a high intercensal population growth rate (3.25%) compared to the average (2%). %) of the group of least developed countries. From 2005 to 2013, the rate of economic growth has fluctuated dramatically. Indeed, from 2.87% in 2005, it reached 5.02% in 2008 before falling to 2.61% in 2010 to reach 5.42% in 2012 then 4.6% in 2013. These variations give rise to questions about the factors that influence the growth rate of Benin's economy. In Africa, the challenges ahead are development challenges. In a world of increased interdependence, these African rent economies, which are highly vulnerable to external shocks, are unable to overcome poverty through their trade openness. Faced with this situation, among the various ingredients needed for industrial takeoff, education and health are certainly the most essential.

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Traditionally, public spending has been seen as a factor in stimulating economic growth through the multiplier effect. Indeed, according to Keynesian logic, public spending can exert a significant counter-cyclical influence on the basic variables of economies, especially on consumption and investment. But under strong budgetary constraints, the public decision-maker makes trade-offs between the various items of expenditure: education, health, justice, security, social policies ... etc. An increase in public spending in favor of a post leads, all other things being equal, to a fall in other public expenditure. Therefore, it is a question of identifying the best lever for the growth of the economy.One of the positions policymakers focus on is health. A significant portion of public spending is spent there every year. In 2012, euro zone countries spent an average of 7.4% of their gross domestic product on health expenditures. Meeting in Abudja, Nigeria in 2001, African Heads of State pledged to devote at least 15% of their country's budget to health.

In Benin, nearly 4.4% of public expenditure is devoted to health. In such a context, we have the right to question the appropriateness of public health spending in the face of the challenge of economic growth. Several studies have addressed the issue. The new theories of neoclassical-inspired economic growth, including the models of Lucas (1988) and Romer (1986), tend to explain the process of economic growth, with particular emphasis on the role of human capital in long-term growth. These models emphasize the endogenous nature of economic growth. Human capital is a stock of economically valuable knowledge that is

incorporated into the workforce. In addition to knowledge and professional qualifications, the field of human capital naturally extends to the state of health and the nutritional status of workers. Nixon and Ullmann (2006) conclude that health spending has had a significant positive but relatively marginal effect on life expectancy (+ 3.5%), but a much larger and negative impact on infant mortality. (- 78,8%), for the countries of the European Union to 15 over the period 1980-1995.Barro (2001) at the end of its work on a sample of 84 countries over the period 1965-1995 reaches results of a 10% increase in life expectancy lead to an increase of 0.56% to 0.62% of Gross Domestic Product (GDP). On the same subject, the WHO Macroeconomics and Health Commission (2001) lead to a lesser extent to the same conclusions. A 10% increase in life expectancy corresponds to an increase in economic growth of about 0.3 to 0.4% per year, with all other growth factors remaining the same.

In view of these elements, we ask ourselves whether public health expenditure has an effect on economic growth in Benin. The search for an answer to this question leads us to approach the theme "impact of public spending on human capital (health) on economic growth in Benin

2. Theoretical and Empirical Review

This subsection of our work tries to take stock of the theory of human capital.

2.1. Theoretical Foundations

In the General Theory, Keynes (1936) focuses on the role of public spending in economic recovery through a multiplier process. In the late 1960s and early 1970s, as the euphoria of economic growth dissipated, there was a resurgence of liberal theses that tackled Keynesian macroeconomics. The appearance of stagflation (simultaneous development of inflation and unemployment) calls into question Phillips' law (1958). The growing difficulties of the 1970s were then explained by the side effects of Keynesian policies. A theoretical corpus (monetarism) became, along with Friedman (1968), the first major current Keynesian. Going beyond his early criticisms of Keynesianism regarding the reality of the fiscal multiplier mechanism, Friedman destabilized standard macroeconomics by reinterpreting Phillips' law. His reasoning allowed us to question the whole logic of Keynesianism .

However, econometric studies do not allow us to settle this debate between Keynesians and monetarists. Depending on whether the authors of the models are in favor of the "crowding out effect", their results confirm (Spencer and Yoke, 1970) or disprove (Blinder and Solow, 1973) this thesis. It must be concluded that the debate on the short-term effectiveness of fiscal policy has not been settled by econometric tests (Aftalion and Ponvet, 1981). This conclusion is reinforced by the school of rational expectations (Muth, 1961, Lucas, 1972, Sargent, 1972) which, by seeking to provide a micro-economic basis for the macroeconomic recommendations of monetarists, leads to a "radical" position: the total ineffectiveness of cyclical regulation policies, be they budgetary or monetary (Sargent and Wallace, 1975).Thus, public expenditures have been interpreted differently according to the currents of economic thought, mainly through growth models that have revealed highly differentiated effects of different components of expenditure on macroeconomic variables and on the property. Thus, a myriad of theoretical and empirical works have addressed the issue to justify the justification of public spending on human capital. The idea that investing in human capital promotes economic growth actually dates back to the days of Adam Smith and early classical economists who have highlighted the importance of investing in human skills. This importance has long been ignored by the World Bank, which since its inception in 1944 has focused its efforts on projects aimed directly at increasing the productive capacity of member countries, rather than financing projects such as construction and schools, colleges and universities. It was not until 1962, after the founding of the International Association for Development (IDA, a subsidiary of the Bank), to see the Bank sign the first loan for education. The rationale for this loan is that education is not only an essential human right, but also a basic component of economic and social development, and that education investments wisely Planned deliver huge economic dividends, especially in the poorest countries. One of the main causes of this change in ideas was the growing interest in the 1960s for the economic value of education, which Bowman (1966) described as "a revolution in human investment in economic thinking ".Indeed, some economists tried to measure the contribution of education to economic growth (Schultz, 1961-1963, Denison, 1962-1967, Krueger, 1968) and many others began to analyze the concept of investment in human capital. (Becker, 1964-1975). Thus, Denison's (1962) attempt to explain US economic growth between 1910 and 1960 in terms of increases in labor and physical capital immediately showed that there was a significant "residue" that could not be explained in this way. This was a challenge for the researchers who then directed their efforts to discover the extent to which the "residue" was related to the effect of education on the work force and other factors. In this regard, Denison showed that almost a quarter (23%) of the growth rate of US output was due to the growth of Labor Force Education. Schultz (1963) will also lead to the same observations. In the mid-1980s, a group of economic growth theorists led by Romer (1986) expressed dissatisfaction with the exogenous explanations of productivity growth. This dissatisfaction was at the origin of the construction of a class of growth models where the main determinants of growth are endogenous to the model. Long-term growth determined in the model, and not externally, by the growth of certain exogenous variables such as technical progress (which is unexplained in Solow's neoclassical model, 1956) is called endogenous growth.This model implies an effect of scale: an increase in the aggregate labor force, L, increases the per capita growth rate of the decentralized economy and the planned economy. Thus, by equating L with the overall labor force of a country, the model predicts that the countries with the most workers experience faster per capita growth. But the empirical results for a large number of countries in the post-WWII period indicate that the growth rate of GDP per capita has only a weak positive relationship with the size of the working-age population. The scale variable reflecting the diffusion effect of knowledge, L, is not very closely related to macroeconomic aggregates. It is precisely Lucas (1988) who

will focus on the role of human capital. It assumes that the learning and diffusion effects are based on human capital and that each producer benefits from the average level of human capital in the economy rather than the aggregate level of human capital. The only difference of result from the Romer model (1986) is that the average capital product and the marginal product of capital no longer depend on L. However, Lucas (1988) has the merit of drawing attention to the role of human capital in the macroeconomic explanation of country growth. Barro (1990), using a model of the Cobb-Douglas form, justifies the merits of public spending and notes that returns to scale in relation to private factors are not increasing. But taking into account the factors provided by the State increases the returns to scale, allowing an endogenous growth process to take place. This construction is similar to that of Romer (1986) except that the aggregated capital stock, K, has been replaced by the quantity of public goods, G

The key conclusion of this type of model is that investments and public services make a vital contribution to growth. Unfortunately, it does not specifically mention the contribution of human capital expenditures. Rebelo (1991), emphasizing the role of human capital, uses a bi sectoral model of growth that postulates that: human capital is obtained by a technology that differs from that of goods;- each of the two production activities has constant returns to scale by; in relation to the quantities of the two forms of capital entering production; the education sector is relatively intensive in human capital (H) and the goods-producing sector is relatively intensive in physical capital (K). Here, the production of human capital requires the use of physical capital. Thus, the imbalance between H and K influences the long-term growth rate. In summary, two large families of models are interested in the analysis of the determinants of economic growth: the first family headed by Solow (1956) assigns no specific role to human capital in the creation of wealth (growth economic). This is explained exclusively by land, labor and capital. But given that these factors alone do not account for all growth, proponents of this trend have assumed the existence of a residual factor called technical progress due in particular to the improvement in the quality of the labor force lumber. The second family (known as endogenous growth models), on the other hand, assigns a more central role to human capital; and she was born with the work of Paul Romer (1986). In this family, there are two subgroups of models, some of which assume that growth is caused by the accumulation of human capital over time (Romer 1986, Lucas 1988), and the others claim that it is a stock of human capital that drives growth by enabling innovation (Romer, 1990) or allowing the country to emulate and adapt to new technology.

2.2. Empirical foundations

The debate on the role of education in the process of economic growth has attracted the attention of a large number of authors in several fields. This debate is enriched mainly in the literature by theoretical contributions as empirical which for the most part are intended to shed light on this debate in order to provide solutions to growth problems. It is in this line that (Grossman, 1995) inscribes that education promotes access to and understanding of medical information. The more educated individuals will be better able to allocate their resources among the different inputs of the health production function. In addition, they make better use of medical visits or medications. With higher incomes, more educated women often have more educated husbands, which can affect the husband's state of health. For example, those who married educated women have the lowest mortality rates (Egeland, 2002). There is a very close link between education and the improvement of women's reproductive health. Educated women marry late and have fewer children than uneducated women. Women's education has a negative impact on fertility rates and infant mortality (Schultz 1989, Behram 1990, Barro and Lee 1994). An inference that can be drawn from this relationship is that women's education can promote economic growth indirectly through a decline in infant mortality and fertility, which allows more resources to be devoted to savings, intended to invest in the basic social sectors, growth drivers. Nixon and Ullmann (2006) both review the empirical literature on macro data on the relationship between spending and health outcomes in developed countries (twelve out of sixteen studies show that health expenditure is a significant predictor for at least one of the outcomes analyzed) and propose their own study, according to which health expenditure had a positive but relatively marginal effect on life expectancy (+ 3.5%), but a much larger impact and negative for infant mortality (- 78.8%), for the countries of the European Union at 15 over the period 1980-1995. Long ignored, the role of human capital in economic growth really began to focus attention from the 1960s. The first works in this direction were interested in the relationship between education and economic growth. Most authors who have addressed the issue agree that education has a direct positive effect on economic growth. Hanushek and Kimko (2000) directly measure the "quality" of the work force from surveys of mathematics and science knowledge. On the basis of series limited to 31 countries, they observe that the countries where the test candidates have the best scores also have the highest rates of economic growth over the period 1960-1990. Paradoxically, in the article by Hanushek and Kimko, the number of years of study in the countries does not explain the differences in economic performance, any more than the educational expenditure of the countries where the rate of supervision in classes. Only the primary school enrollment rate and membership in an Asian country affect performance. Using the Mincerian equation, from data collected in Botswana, Siphambe (2000) shows that yields are increasing with education level. As for them, Psacharopoulos and Patrinos (2002) calculate that, on average, for the whole world, the increase in individual incomes, associated with an additional year of schooling, is close to 10%, with large disparities. In general, the impact of schooling is stronger for the poor population groups, whose average level of education is lower: it reaches 9.9% in Asia, 11.7% in Sub-Saharan Africa 12.0% in Latin America, compared with 7.5% for OECD countries; 10.9% for low income countries versus 7.4% for high income countries; 9.8% for women versus 8.7% for women. The private return of all primary education (26.6%) is higher than that of secondary education (17.0%) or higher education (19.0%), with the same variations by region of world, income level, and gender: 37.6% for primary schooling in sub-Saharan Africa compared with 11.3% for secondary schooling in the

OECD. These private returns correspond to social returns, including both the costs of education policies and their benefits other than wage increases. In the absence of systematic profit estimates, Psacharopoulos and Patrinos offer returns calculated from private profits and total costs (public and private), lower than private returns, but essentially having the same characteristics. The main conclusion of this work is that for developing country governments, education policies represent a particularly effective investment, especially in primary education. Some general conclusions from these studies can be drawn from samples from a large number of countries. For almost all studies, health has a significant impact on growth, with a five-year increase in life expectancy resulting in 0.3 to 0.5 points of additional growth. A second important result is that the impact of health on growth is marginally decreasing, becoming nil beyond a certain level of health (Bhargava et al., 2001, Jamison et al., 2004). There may even be a level of health status beyond which the benefits of improved health status do not outweigh the costs of that improvement, so negative marginal returns will occur. Acemoglu and Johnson (2008) attribute this result (negative returns) to the negative effects of population size on growth. In the same logic according to the study on the efficiency of public expenditure on human capital in Benin (Dahoui, 2000).), the overall inefficiency of public spending on human capital is seen in light of the low positive impact of health spending and the negative effect of education spending on output. These unsatisfactory results are justified on several levels: firstly, an under-utilization of the resources allocated because of poor budget management. Second, allocative inefficiency due to political and administrative corruption that skews choices and the efficiency of spending. Similarly, a first type of inefficiency-X induced both by the regional disparity of achievements and the difficulty of access to social services because of the low capacity of financial contribution of beneficiaries. Finally, a second type of inefficiency-X spending considering the quality of achievements. However, this overall inefficiency should not lead to a drastic reduction or a systematic increase in the level of social spending. For public spending on human capital to be leveraged, inefficiencies must be corrected and coupled with a proportionate mix of resource allocations in a more comprehensive framework of sustainable human development strategies. Moreover, the limits of this analysis in no way undermine its explanatory scope and its predictive power since "to explain is to provide for" But it deserves to be extended by other more encompassing works. The present work can only serve as a "breadcrumb" if the rulers take it on their account because "men are powerless to ensure the future, the institutions alone set the destinies of peoples":>. SeydouKoné (2016) evaluates human capital development policies and their impact on economic growth and household welfare in Ivory Coast A dynamic computable general equilibrium model was used to measure the impact of public education and health spending policies as planned by the government and then the effects of a larger increase in these expenditures on economic growth and the welfare of households in Côte d'Ivoire. The results of the simulations show that public spending on education and health has positive impacts on the demand for education and health, on improving the quality of the work factor and the productive capacities of poor and vulnerable households. They also reveal that there is a positive correlation between public spending on education and health, economic growth and well-being in Ivory Coast

3. Data sources and model specification

3.1 Sources of study data

The data used in this work come mainly from four sources. Some macroeconomic information (public expenditure on health, public expenditure on investment in health) comes from the Directorate General of Economic Analysis. As for data on Gross Domestic Product, exports, imports and employment. The rainfall data come from the National Meteorological Service of ASECNA - Benin. Other data used (life expectancy at birth, population growth rate) were obtained from the database of the World Bank version updated 09/09/2015. The reliability of these data is assumed since these sources have often been used for studies that have been conclusive.

3.2 Specification of the analysis model

The study aims to assess the effects of public investment in human capital (health) on economic growth. It is therefore for us to explain the national production by human capital. To this end, we adopt a human capital production function of the general form:

Yt = F (Kt, Ht, Et) (1)

In this model, the explained variable (Yt) is the growth rate of the real product per capita. At the level of the explanatory variables, we distinguish on the one hand the state variables that are the stock of physical capital per capita (Kt) and the stock of human capital (Ht) and on the other hand the environmental and economic policy variables represented by (Et). Specifically, we consider the human capital production function of Barro (1996). We modify this model to take into account factors that may influence overall production.

The production function is written:

$$Y = V^{\alpha} K^{\beta} H^{\gamma} (AL)^{1-\alpha-\beta-\gamma} \quad (2)$$

With

$$\alpha > 0;\ \beta > 0;\ \gamma > 0\ et \alpha + \beta + \gamma < 1$$

Y is the total production; K represents the physical capital; It materializes human capital; AL means the actual work; V is a vector of variables that affect overall factor productivity outside of human capital.

By asking:

$v = {}^{V}/_{AL}\,; k = {}^{K}/_{AL}\,; h = {}^{H}/_{AL}$ We obtain the following simplified form:

$y = v^{\alpha} k^{\beta} h^{\gamma}$ **(2)**

Applying the logarithm to equation (2), we obtain its linear form:

$\log_{f0}(y) = \alpha \log_{f0}(v) + \beta \log_{f0}(k) + \gamma \log_{f0}(h)$ (3)

Equation (2) decomposes the GDP per worker. We will modify this equation and introduce the variables of our study to obtain an econometric model of growth. The model to estimate is written:

$$\log(PIB_t) = C_0 + C_1 \log(DSANT_t) + C_2 \log(\text{ESVI}_t) + C_3 \log(\text{DInvSant}_t) + C_4 \log(\text{TBSP}_t) + C_5 \log(TBSS_t) + C_6 \log(\text{TXPOP}_t) + C_7 \log(\text{PEXT}_t) + C_8 \log(\text{HPLUVIO}_t) + \varepsilon_t$$

The Ci, (i = 0; 1; 2; 3; 4; 5; 6; 7; 8; 9) are the coefficients of the model. PIB_t is the growth rate of Gross Domestic Product ((PIB) per capita for year t; he is the variable to explain. Human capital is taken into account under its two components namely education and health. The variables of education are TBSP_t and TBSS_t which respectively denote the gross primary school enrollment rate in year t and the secondary gross enrollment rate in year t. Health is represented by the variables DSANT_t, $ESVI_t$ and $DInvSant_t$ respectively designating public health expenditure for year t, life expectancy at birth in year t and health expenditures. Investment in health in the year t that materialize passive health coverage. In fact, given the unavailability of data on the health coverage rate for the period of our study, we chose the health investment expenditure as a variable representative of the availability of health infrastructures. TxPOP Refers to the growth rate of the population in year t; As Benin's resources are essentially fiscal, it is useful to take into account the trade with the outside world that we represent through the policy of openness to the outside world (PEXT). To take into account the influence of agriculture on the economy, we integrate the climate hazards materialized by the average rainfall height (HPLUVIO) into the model. εt represents the error term.

3.3. Description of the variables of the model

Our job is to try to explain the growth of the economy by the variables of human capital. For this purpose, the variable to be explained is the growth rate of GDP per capita; we noted it PIBTt. It is equal to the ratio of GDP to employment. The explanatory variables consist of state variables and control variables. State variables are those that materialize human capital. For health, these are public health expenditure (DSANT), life expectancy at birth (ESVI) and health investment expenditure (DInvSant) and for education, the rate of gross primary school enrollment (TBSP) and gross secondary school enrollment ratio (TBSS). Public health expenditure expresses the efforts of the public authorities to ensure the health status of the population. This is public health expenditure reported to the population. Life expectancy at birth is the indicator of improvement in health status. The availability of health infrastructure is represented here by public spending on investment in health per capita. This variable was chosen to represent passive health coverage because data on the health coverage rate are not available for the entire period of our study. The gross enrollment ratio is considered basic training for workers, allowing them to adapt more easily to learning by doing, to vocational training and to healthy living behaviors. Control variables are economic and economic variables. They represent the variables that can influence economic growth. In the category of economic policy variables, we have the openness rate of the economy (PEXT) and in terms of environment variables; we have the population growth rate (TxPOP) and the average rainfall height (HPLUVIO).

The rate of openness of the economy takes into account the extrovert nature of the economy and the influence of foreign trade on the growth of the economy. This variable also incorporates the influence of imported technology products on the economy. It is obtained by the ratio between the half sum of imports and exports and the GDP either

: PEXT = ((imports + exports) / 2) / GDP

Agriculture playing a role in the national economy and heavily dependent on rain has attracted our attention for the consideration of this variable. It represents the amount of rain that falls each year. This is the average annual rainfall height. It is expressed in millimeters.

The population growth rate is introduced in the model to take into account the influence of changing demographic weight on economic growth.

4. Results and Discussion

4.1 Statistical test results

One of the requirements for OLS estimation of a time series model is that each of the variables in the model is stationary. This condition protects against the risks of fallacious regressions. The stationarity study of the series will be done using the Dickey - Augmented Fuller (ADF) test on the Eviews software. Unit root tests not only detect the existence of non-stationarity but also determine what type of non-stationarity it is. Using the Eviews software, we performed the unit root test on each series. In summary, at the end of the tests, none of the series is stationary at the 5% level. Let's examine the order of integration of non-stationary variables. For this purpose, we will do the test of Dickey - Fuller Augmented in first difference. After the Dickey - Fuller augmented first difference tests carried out under the EVIEWS 3.1 software and whose results are presented in Appendix 1, it appears that the log (PIBT), log (DSANT), log (ESVI), log variables (DInvSant), log (TBSP), log (TBSS), log (PEXT), log (TxPOP) and log (HPLUVIO) are stationary at first difference at the 5% threshold. From the results of the Johansen test shown above, it appears that there are eight (08) cointegration relationships at the 5% threshold between the model variables; so we can formulate the error correction model.

Table 1: Results of the cointegration test

Series LOGDINVSANT LOGDSANT LOGESVI LOGHPLUVIO LOGPEXT LOGTBS LOGTBSS LOGTXPIB LOGTXPOP				
Lagsinterval : 1 to 1				
	Likelihood	5 percent	1 percent	hypothesized
Elgenvalue	Ratio	Critical value	Critical value	No. Of CE(s)
0.997290	625.4436	192.89	205.95	None**
0.971426	430.3859	156.00	168.36	At most1**
0.941623	313.0619	124.24	133.57	At most2**
0.885531	219.3145	94.15	103.18	At most3**
0.790098	147.7885	68.52	76.07	At most4**
0.721640	96.27165	47.21	54.46	At most5**
0.613283	54.06991	29.68	35.65	At most6**
0.455637	22.71785	15.41	20.04	At most7**
0.077142	2.649244	3.76	6.65	At most8**

*(**)denotes rejection of the hypothesis at 5%(1%) significance level
L.R test indicates 8 cointegrating equation(s) at 5% significance level

Sources: Our estimation results, 2017

4.2. Model estimation

The variables of our model are not all stationary at the beginning. As the Johansen test has noted the existence of cointegration between the variables, the estimation will be done in two stages. First, we will have to estimate the long-term model and then in the second step we will look at the error correction model for the short-term relationship.

4.2.1. Long term model

La spécification de notre modèle est :

$\log(PIB_t) = C_0 + C_1 \log(DSANT_t) + C_2 \log(\text{ESVI}_t) + C_3 \log(\text{DInvSant}_t) + C_4 \log(\text{TBSP}_t) + C_5 \log(TBSS_t) + C_6 \log(\text{TXPOP}_t) + C_7 \log(\text{PEXT}_t) + C_8 \log(\text{HPLUVIO}_t) + \varepsilon_t$

After a first estimate, the graph of the residues obtained predicts the presence of abnormal values (see Appendix 1). We have therefore corrected these values by introducing a dummy variable D06. The final estimated long-term model is as follows.

Table 2: Result the final estimate of the long-term model

Dependent Variable: LOG(PIBT)				
Method: Least Squares				
Date: 10/12/17 Time: 11:21				
Sample: 1980 2014				
Included observations: 35				
Variables	Coefficient	Std. Error	t-Statistic	Prob.
C	-51.79953	13.75595	-3.765609	0.0009
LOG(DSANT)	0.171971	0.072148	2.383572	0.0251
LOG(ESVI)	3.591096	0.898924	3.994884	0.0005
LOG(DINVSANT)	-1.207882	0.107028	-11.28569	0.0000
LOG(TBSP)	-0.126883	0.138704	-0.914772	0.3691
LOG(TBSS)	0.235427	0.045346	5.191798	0.0000
LOG(TXPOP)	-0.327387	0.109369	-2.993417	0.0061
LOG(PEXT)	-0.069194	0.040776	-1.696910	0.1021
LOG(HPLUVIO)	8.152288	2.385586	3.417311	0.0022
D06	-0.161739	0.033859	-4.776782	0.0001
R-squared	0.984513	Meandependent var		12.74830
Adjusted R-squared	0.978938	S.D. dependent var		0.218145
S.E. of regression	0.031659	Akaike info criterion		-3.832622
Sumsquaredresid	0.025058	Schwarz criterion		-3.388237
Log likelihood	77.07089	F-statistic		176.5841
Durbin-Watson stat	1.427175	Prob(F-statistic)		0.000000

Sources: Our estimation results, 2017

The Fisher statistic and the coefficient of determination indicate that the model is globally significant even at the 1% threshold and explains at 98% the variations of gross domestic product per capita. The statistics of Durbin and Watson are in the zone of doubt. Let's carry out the Godfrey - Breusch autocorrelation test to assess the behavior of the errors. In addition, other tests were carried out to judge the validity of the model. For the Godfrey - Breusch test, the probability associated with the Fisher statistic (under the null hypothesis of no autocorrelation of errors) is 0.145094> 5%. It therefore appears that the errors are not correlated. The Jarque-Bera normality test reveals that the residues are normally distributed. The results from the White test lead us to conclude that residues are homoscedastic (Probability = 13% above the 5% threshold). In total, the conditions of validity of our long-term model are met. We will proceed to estimate the short-term model.

4.2.2. Estimation of the short-term model

The results of a first estimate of the short-term model (see appendix 2) reveal, through the graph of the residues obtained, the existence of abnormal value over certain years. We have corrected these values by introducing two (02) dummy variables. The final estimated model presents the results of the following table

Table 3: Result of the final estimate of the short-term model

Dependent Variable: D(LOGPIBT)				
Method: Least Squares				
Date: 10/12/17 Time: 12:20				
Sample(adjusted): 1981 2014				
Included observations: 34 after adjusting endpoints				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.051293	0.019958	2.569984	0.0175
D(LOGDSANT)	0.010778	0.037487	0.287518	0.7764
D(LOGESVI)	-3.993091	1.453059	-2.748058	0.0117
D(LOGDINVSANT)	-0.337318	0.140187	-2.406211	0.0250
D(LOGTBSP)	-0.050650	0.074678	-0.678246	0.5047
D(LOGTBSS)	-0.058301	0.049537	-1.176929	0.2518
D(LOGPEXT)	-0.008627	0.027221	-0.316928	0.7543
D(LOGTXPOP)	0.093752	0.139716	0.671022	0.5092
D(LOGHPLUVIO)	0.786174	3.595744	0.218640	0.8289
RESID01(-1)	-0.002728	0.156215	-2.217463	0.0262
R-squared	0.886991	Meandependent var		0.012877
Adjusted R-squared	0.830487	S.D. dependent var		0.046382
S.E. of regression	0.019096	Akaike info criterion		-4.808076
Sumsquaredresid	0.008023	Schwarz criterion		-4.269360
Log likelihood	93.73729	F-statistic		15.69778
Durbin-Watson stat	1.267339	Prob(F-statistic)		0.000000

Sources: Our Estimation Results, 2017

We have: Adjusted coefficient of determination: 0.83

Fisher's statistic: 15.69778 and the associated probability is: 0.000000 the statistic of Durbin - Watson is: 1.27. The coefficient of the restoring force is negative and significant at the 5% threshold. The writing of the model is therefore justified. The value of the coefficient of determination allows us to say that the model explains a good part of the variations of D (log (PIBT)). The model appears to be globally significant with respect to the value of the Fisher statistic. The analysis of the individual significance of the coefficients of the exogenous variables shows that only D (LOGESVI) and D (LOGDINVSANT) are significant. However, the signs of the coefficients are different from the expected signs. The other usual tests were also carried out on the short-term model (see Annex 3). The Godfrey - Breusch test indicates that the errors are not correlated. Indeed, the probability associated with the Fisher statistic (under the null hypothesis of no autocorrelation of errors) is 0.11> 5%. The Jarque-Bera normality test reveals that the residues are normally distributed. The results from the White test lead us to conclude that residues are homoscedastic (Probability = 20% above the 5% threshold). The different models being estimated, we will proceed to the analysis and discussions of the results.

4.3. Analysis and discussion of results

From the results of our estimates, the specifications of both models are valid, whether long-term or short-term. In the long term, changes in Gross Domestic Product (GDP) per capita are roughly 98% explained by the exogenous variables identified, namely public health expenditure (DSANT), life expectancy at birth (ESVI), public investment in health (DInvSant), primary gross enrollment ratio (TBSP), secondary gross enrollment ratio (TBSS), policy of openness of the economy to the outside world (PEXT), population growth rate (TxPOP) and average rainfall height (HPLUVIO). The health variables: DSANT, ESVI and DInvSant are those directly related to the verification of our assumptions. In the short term, the changes in the Gross Domestic Product are roughly 83% explained by the same variables. But taken individually, the significance of the variables is not conclusive. According to our results, in the long run, public health expenditure variables, life expectancy at birth, health investment expenditures, secondary gross enrollment ratio, population growth rate, and average precipitation height influence significant Gross Domestic Product.

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For public health expenditure, the sign of the coefficient obtained is in line with our expectations and indicates that in the long term these expenditures have a positive effect on Benin's economy. In the long term, the elasticity to public health expenditure of the Gross Domestic Product is 0.172. This means that in the long term, an increase in public health expenditure of 1% will lead to an increase in the Gross Domestic Product of 0.17%, all things being equal. In the short term, the effect on economic growth of the same change (1%) in public health spending would be 1.07%. Note however that in the short term, the effect of these expenditures on GDP is not significant. These results are slightly different from those of BALDE A. (2004) on Senegal data. As a result of his work, he concludes that a 10% increase in health spending would improve growth by 0.38% in the long term and 0.48% in the short term. However, whether in the short or long term, these coefficients were not significant. For lack of unavailability of the data, the author had worked solely on health expenditures made by the Ministry of Health of Senegal; these data do not take into account the health expenses of the other ministries (school health, military health ...). The results we have obtained on public health spending confirm our third hypothesis that public health spending has a positive effect on economic growth.

With regard to life expectancy at birth (ESVI), the results obtained for the long term are consistent with the teaching of our theoretical analysis. Indeed, the estimation of the long-term relationship shows that the sign of the coefficient relative to life expectancy at birth is positive and significant at the 1% threshold. The result obtained in the short term, although significant, presents a sign contrary to that expected. It appears that a 1% increase in life expectancy at birth would result in a 3.59% increase in GDP over the long term. These results confirm those of Ayato and Ahossi (2010) who concluded that in the long term, a 1% increase in life expectancy at birth results in a 5.53% increase in GDP in Benin. In the short term, they arrived at the result that the effect of life expectancy at birth is not significant. On the Senegalese data, Balde (2004) also concludes with the positive effect (0.02) of life expectancy at birth on long-term economic growth and a non-significant effect in the short term. The WHO Commission on Macroeconomics and Health (2001) has reached the conclusion that 10% increase in life expectancy corresponds to an increase in economic growth of about 0.3 to 0.4% per year, all other growth factors remaining identical. These results are also similar to those of Bloom, Canning and Sevilla (2001) who after working on a sample of 104 countries over 31 years conclude that the increase in life expectancy at birth of 1 year would lead to an increase of 2.4 to 4% of GDP.

5. Conclusion

We have attempted through a study to measure the impact of public health spending on economic growth in order to help identify the determinants of economic growth. Indeed, Benin, like other developing countries, is working through its fiscal policy to increase its economic growth for the improvement of the living conditions of its population.

At the beginning of our work, we revisited the socio-economic context of Benin before taking stock of previous work that addressed the question of the impact of human capital on economic growth. Following this, we defined the methodological framework before approaching the actual work. From the analysis of the socio-economic context, we note that Benin's economic growth remains unstable and highly dependent on the primary and tertiary sectors. The overall health profile is characterized by a high morbidity and mortality table mainly due to communicable diseases and anemia of infectious and nutritional origin. Despite the efforts of individual governments, the share of the national budget allocated to the health sector remains below global and regional thresholds. From the study of the results of previous work, we note that more and more the effect of human capital on economic growth is focusing attention and the vast majority of the work is leading to the conclusion of a positive effect. For a long time, different researches have been focused on educational human capital and health. This component is only really taken into account in the works in recent decades. The results obtained are still in favor of investment in health.

The definition of the framework of the study led us to mark out the contours of our work in particular as regards the methodology. It is the human capital production function of Barro (1996) that inspired us to specify our model. The study covered the period from 1980 to 2014. The work took into account the variables related to health, those related to education in economic policy and phenomena beyond the actions of governments. Thus, we have included in the model GDP per capita, public health expenditure per capita, life expectancy at birth, health investment expenditure (in the absence of sufficient data on health infrastructure coverage). , gross primary and secondary enrollment rates, population growth rate, openness of the economy and average rainfall. As a result of our work, these variables account for 98% overall and significantly the variations in GDP per capita over the long term and 83% for the short term. From the results of our econometric estimations, it

appears that: In the long term, an increase in public health expenditure of 1% will lead to an increase in the Gross Domestic Product of 0.17%, all things being equal. In the short term, the effect on economic growth of the same change (1%) in public health spending would be 1.07%. However, the short-term effect of these expenditures on GDP is not significant; a 1% increase in life expectancy at birth would result in a 3.59% increase in GDP over the long term; for both the long run and the short run, the effect of public investment spending on health on GDP is significant. However, the signs obtained are contrary to those expected. Our work suggests a negative effect on GDP; the gross secondary school enrollment ratio, the population growth rate and the average rainfall rate significantly influence the Gross Domestic Product. In the light of these conclusions, we would suggest to decision-makers the strengthening of actions in human capital, particularly in its health component, to give impetus to economic growth and poverty reduction in Benin. An increase in health expenditure to a certain threshold can lead to a substantial improvement in economic growth. It will be interesting to look for the optimal threshold at which public health spending will quickly achieve the double-digit growth expected for a real take-off of our economy. Our results, although conclusive for most long-term variables, remain nuanced for some variables and for the short term. In fact, the gross secondary schooling rate has a significant positive effect on GDP, whereas the gross primary schooling rate would have a negative effect on GDP. Similarly, public spending on investment in health would have a negative effect on GDP per capita. These different results could be related to the data used and the variability of sources of data sources. We would therefore suggest that other work in Benin could look at the effect on GDP of these different variables, notably the gross primary enrollment rate and the health infrastructure coverage, in order to better appreciate the impact of these factors on the population. national economy.

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