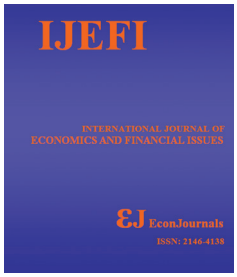

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Public Spending on Human Capital and Economic Growth in Morocco

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ABSTRACT

The purpose of this paper is to measure the impact of public spending on human capital on economic growth in Morocco. The data cover the period between 1990 and 2019. Through the ARDL estimation model that is more appropriate to the structure of our data, the results reveal that human capital spending is conducive to economic growth in the current year and less conducive in subsequent years. Human capital spending in the long run has a beneficial effect on economic growth in Morocco and the effect is more severe for health spending than education spending. In view of these results, economic policies must support the administration of human capital expenditures towards investment expenditures in the education and health sector.

Keywords: Human Capital, ARDL Model, Economic Growth, Public Expenditure
JEL Classifications: B21, B22, B23, B55

1. INTRODUCTION

Since the 1940s, the productive role of public spending has undergone enormous development as a result of the balanced growth debates affiliated with development thinkers (Hirschman and Sirkin, 1958; Rosenstein and Ridan, 1943). These debates, however, were hastily concealed from the 1960s onwards, as the idea moved along the lines of short-term questioning and the refutation of the crowding-out effect of public spending and the multiplier effect. For more than 30 years, public spending was seen as a factor stimulating demand for the recovery of the economy according to the Keynesian perspective, and then its hidden productive role. The perception of the role of public spending as a factor of economic growth has changed significantly in recent years. We are currently witnessing a renaissance in the analysis of the impact of this expenditure on economic growth, notably thanks to the theory of endogenous growth, which emphasizes the positive externalities generated by certain public services.

In fact, Solow (1956) model concluded that long-term economic growth is explained by factors such as capital, labor and technological progress. The search for explanatory factors of technological progress led to the integration of human capital as a determinant of economic growth by economic growth theorists. Authors such as Mankiw et al. (1992), Benhabib and Spiegel (1994) and many others examine human capital as a major variable of macroeconomic development. Human capital theorists (Schultz 1961 and Becker 1964), both Nobel laureates, placed human capital at the center of productivity gains; they demonstrated that higher levels of education can increase worker productivity. This is why countries are investing more in education and health, two key components of human capital. These expenditures are a reappearance of human capital development and improvement of

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the quality of human capital, which admits to contribute positively to boosting economic growth. Policymakers in developing countries like Morocco often devote a moderate portion of public spending to improving public health and education. Indeed, in all developing countries, the health and education sectors usually have a relatively small share of the budget allocation. However, the trend has shifted proportionately over the past 25 years. In the 1970s, interest in health and development increased. This was due to the emphasis on equity-based development strategies. Then, in the 1980s, concerns about the impact of slowing economic growth led to the view that health care costs were the same as education costs. It represents an investment in human capital.

In the 2001 Abuja Declaration, African leaders agreed to allocate 15% of their national budgets to health care, but by 2013, only five African countries had met this target (World Bank, 2014). In Morocco, in disillusionment with the difficult situation dedicated by the drought and the pandemic, the Moroccan economy has maintained reasonable results over the previous years. Tangible growth has averaged 3.4% per year and inflation has been set at 5.8% (HCP Morocco Report; 2022). In the period 2003-2013, growth averaged 4.6% per year, compared to an average of 3% between 1992 and 2002 (HCP, 2013). It can be said that economic activity has been in a long growth cycle, with nearly 54 consecutive quarters of growth, in contrast to the short cycles of the 1990s. However, with population growing at about 1.1% per year, annual growth in gdp/head is modest. An analysis of expenditure policies from a functional taxonomy perspective highlights the evolution of educational functions related to the increase in student enrollment and teacher employment to achieve development goals. Indeed, Morocco spends 25% of its budget on education and is considering a "Strategic Vision for Education Reform" from 2015 to 2030. According to UNESCO 2018, Morocco accounts for "The 25 least accelerated ethnicities in terms of schooling." The health function is also growing, with spending on empowering health workers, subsidizing health facilities as part of their public mandate, managing diseases, and administering free care policies for specific medical conditions (PEFA Report, 2019).

The government of Morocco considers education and health to be priorities for strengthening the pillars of the social state by ensuring true equality of opportunity for all citizens and strengthening the Kingdom's human capital. However, according to human capital theorists, investments in these sectors increase human productivity and enable economic growth (Becker, 1964). This undoubtedly motivates the Moroccan government to use these two sectors as pillars in the fight against poverty. According to the latest estimates of the Human Capital Index, there will be an average improvement in performance of 5% worldwide between 2010 and 2020. In Morocco, the increase reaches 6%, mainly due to progress in education. Learning outcomes are a key component of human capital and one of the bestpredictors of sustainable growth and poverty reduction in a country. Morocco's progress is therefore encouraging, although significant challenges remain in terms of education quality, equality of opportunity, and governance across the sector. The share of health care in the government budget has increased over the years and now represents 28.12 billion dirhams (MMDH), an increase of 19.5%. The Moroccan health system is undergoing an advanced regionalization reform with the institutionalization of 12 new regions. The extension in 2012 of the Health Insurance for the Poor and Vulnerable (RAMED) has enabled 8.5 million additional people to access public health services free of charge. Employees in the public and private sectors are covered by compulsory health insurance (AMO). The government is working on health insurance for the self-employed, who represent one-third of the population. However, Moroccan citizens have expressed dissatisfaction with the health system, particularly the quality of care and unequal access to services, noting that there are significant differences between urban and rural areas (World Health Organization, 2018).

Despite all these efforts to invest in human capital, Morocco's economic growth averages around 6%. The originality of our article is that it underwrites to know, after consideration of efforts supplied to raise education and health spending through the 10-year programs by Morocco. It will focus economic policymakers on the influence of human capital spending on Morocco's economic growth. The remainder of the paper will focus on the status of the literature review, the methodology adopted, the discussion of the results, and the conclusion.

2. LITERATURE REVIEW

This literature review is subdivided into theoretical and empirical contributions below.

2.1. Theoretical Input

The fundamental question in development economics is: Why are some countries poor and others rich? Smith (1776) already stressed the importance of human capital in The Wealth of Nations, and investment in human capital increases future productivity. This was then further developed by human capital theorists, notably (Mincer, 1974; Becker, 1975), who argued that educated and healthy people have greater opportunities to participate in the labor market and therefore reduce their chances of being unemployed. In the initial growth model developed by Solow (1956), long-term growth depended on technological progress, but its origins were not really analyzed. The work of Romer (1990) and Lucas (1988) focuses on the search for this progress by the factors of economic growth. On the basis of a more presented analysis, these authors improve that countries whose populations benefit more from greater educational efforts become richer. Even with the role of education identified, the mechanisms by which it affects economic growth remain to be determined. Investing in the education and health of the poor has beneficial effects on productivity, income and economic growth (Diagne, 2007). According to his explanation, the poverty reduction strategy focuses on these two sectors. Considering human capital as a factor of growth is not specific to growth models. Maddison's (1987) analytical work, conducted in the tradition of Solow, incorporates an index of "quality of work" that multiplies the efficiency of the latter.

Lucas (1988) model is based on the standard assumption of human capital theory that the human capital of all agents can be classified into a single stock similar to physical capital. The Lucas model thus traces the source of growth to the accumulation of human capital

by individuals in a context of increasing income. While Lucas' model directly introduces human capital as a factor of production of the final product, Romer's model assigns a slightly different role to human capital. Technological innovation, the authors argue, is a source of growth and also provides monopoly power, which is the main incentive to implement new processes.

In the Howitt and Aghion (1998) model, either lower production costs or higher product quality will lead to higher productivity for the economy as a whole and for the future. Grossman (1999) places the concept of "human capital," in the life cycle and in the investment in health and care demand, equating the investment of individuals to improve both quality of life and work capacity and thus their incomes. Behrman and Knowles (1998) has theoretically analyzed how growth and health interact. Health is an integral part of human capital and investments in health have direct and indirect impacts on productivity, which translates into economic growth. In most developing countries, public investment accounts for a high proportion of total expenditure because of the role played by governments in providing infrastructure, such as transport, telecommunications, health, and energy, some research studies have been conducted to assess the contribution of public expenditure on transport to growth. Improved health contributes to economic growth in a number of ways: by limiting production losses due to epidemics of labor morbidity; and, in short, by providing other ends to the expedients that would otherwise have helped pamper the sick. The most obvious impacts of better health on people are reduced days lost to illness, increased productivity, improved access to better paying jobs and "longer working lives."

In the 1980s and 1990s, the focus on education was part of endogenous growth theory. This theory views education as a process of modifying the technology of production itself (Romer, 1990; Howitt and Aghion, 1998) and facilitating the adaptation of foreign technology (Barro, 1999; Sala-i-Martin, 1997; Hall and Jones, 1999). It also helps the transfer of resources to the most technologically dynamic sectors of the economy (Schiff and Wang, 2004). In the extended neoclassical growth model (Mankiw et al., 1992), it appears that education should have a positive effect on income growth. Yet, a minimum level of education may be required for education to have a measurable impact on growth (Rebelo, 1991). According to Grossman (1999), health is considered a capital good because the production of health determines the time spent at work. Healthy people are more productive because they are less likely to be sick and absent from work. Proponents of the new economic growth theory associated with the authors (Romer, 1986; Barro, 1991 and Lucas, 1988) have resurrected interest in studying capital as a determinant of economic growth.

The United Nations Development Program (UNDP, 1994) states that the development of hospital infrastructure and the educational level of the population has reduced mortality rates, resulting in an increase in the life expectancy of the population. The UNDP points out that investing in the construction of academic health centers can advance research to better care for people. In fact, spending on health benefits in developing countries is inaccessible to large segments of the population. This makes the construction of health centers an important indicator in the context of health and economic growth. However, this indicator may be biased in that teaching hospitals are most often built on campus and are more likely to consider building health centers and hospitals in remote areas. In most developing countries, public investment accounts for a high proportion of total spending, reflecting the role of the public sector in providing infrastructure such as education, transportation, telecommunications, and energy. Some investigative work has been done to assess the contribution of public spending on health to growth.

2.2. The Empirical Contribution

Investigation into human capital and public spending are the main factors explaining endogenous growth (Diagne, 2018). However, according to the authors, health and education are the only sectors that integrate these factors. Human capital subsequently appears to be a key factor in economic growth. The link between economic growth and human capital is most often addressed in the literature through regressions in various countries using physical capital, several other environment-related variables. Denison (1961) offers 23% of the economic growth of the United States from 1930 to 1960 to improvements in education. Romer (1986) and Lucas (1988) are credited for the first empirical studies emphasizing the relationship between manufacturing and education. But Schultz was arguably the first to say, in a 1961 article, that economists have always believed that labor explains the origins of a nation's wealth. Schultz (1961) of the Chicago School writes: These are important, can be invested in development and form human capital. The author extends the notion of investment to include all activities that enhance an individual's skills and performance, such as health expenditures, formal education, continuing education, adult education programs (such as agricultural extension) and migration. Subsequently, Becker (1964), a pioneer in human capital theory, developed a comprehensive theoretical basis that showed the importance of investing in human capital. For him, human capital is an investment in education, training, skills, health and other values that are inseparable from the individual. The literature describing the relationship between human capital and growth will evolve differently, depending on how human capital is measured and the mechanisms by which it influences economic growth.

Issolah et al. (2021) reveal that human amplification is a tool for measuring and assessing the degree to which countries are successful in meeting the socio-economic needs of their populations. They use the ARDL model for Algeria from 1986 to 2017 to analyze the impact of human capital development on economic growth. They conclude that there is a positive correlation between schooling and growth, as well as a negative impact of health expenditures on economic growth.

In their study on the contribution of public spending on human capital and economic growth in Mali, Bamba et al. (2021) use an ARDL model linking human capital, investment and health to economic growth from 1986 to 2018. The empirical results highlight the key role and positive impact of various aspects of human capital on economic growth in Mali, both in the long and short term.

El Houda Sadi and Rezine (2021) use panel data for Algeria, Tunisia, Iran, Jordan, and Egypt to find significant positive impacts of fixed investment, primary and secondary education on real GDP. Bathily and Gueye (2021) examine the relationship between public health spending and economic growth in 25 sub-Saharan African countries. Using a VAR panel on data from 1996 to 2016, the authors find that an increase in public health spending could lead to improved health outcomes through improved life expectancy, and thus long-term economic growth.

Piabuo and Tieguhong (2017) examine the impact of dedicated health spending between countries in the CEMAC subregion and other five African countries. They employ ordinary least squares (OLS), modified full ordinary least squares (FMOLS), and dynamic joint least squares (DOLS) panel estimation methods. The results showed that health care spending had a positive and significant impact on economic growth in both samples considered. A one-unit change in health spending could increase GDP per capita by 0.38 and 0.3 units, respectively, in the other five African and CEMAC countries reaching the Abuja goal, a significant difference between the two samples of about 0.08 units. Moreover, there is also a long-run correlation between health spending and economic growth in both groups of countries. Mohapatra (2017) uses a two-step approach to examine the causal relationship between economic growth, public health spending, and infant mortality: economic growth and infant mortality rate (IMR) in the Indian context. The results show that Granger GDP boosts both short-and long-term government spending on health care, while Granger government spending boosts only long-term GDP. We also find that long-run IMR increases government spending on health and economic growth. However, the inverse relationship between infant mortality and public health spending and/or economic growth was not significant.

Dinçer and Yuksel (2019) identify a causal relationship between health spending and economic growth in emerging economies (India, China, Russia, Indonesia, Mexico, and Turkey). They use Pedroni's panel cointegration technique and Dumitrescu Hurlin's panel causal analysis for the period 1996-2016. As a result, using the Pedroni panel cointegration test, the authors find evidence of a long-run causal link between economic growth and public health expenditure. However, the latter does not hold between economic growth and private health spending. According to the consequences of the causal analysis of the Dumitrescu Hurlin panel, they complete that there is no causal link between the health expenditures and the economic growth. However, it is identically noted that economic growth is the main driver of total public and private health expenditures.

Using the modified ordinary least squares (MOSL) method, Omitogun et al. (2016) show a positive and significant association between human capital components (education spending, health spending) and growth in Nigeria. In the same country, authors found that education and health spending had a positive impact on growth (Ojo and Oshikoya, 1995; Adamu, 2003; Mba et al., 2013). Thus, life expectancy is positively correlated with GDP growth and that the effect of spending on health is higher than that dedicated to education. However, other authors have found contradictory results. Lawanson (2009) and Jaiyeoba (2015) argue that budgets allocated to health and primary education have a negative impact on growth. In a VAR model, Keho (2009) concludes that total public spending and education do not significantly affect gross domestic product (GDP) and that changes in GDP have a positive impact on public spending in the health sector.

At the end of this overview of the theoretical and empirical literature review, we find that the descriptions of various proponents value human capital differently in quantifying its impact on economic growth. Moreover, multiple estimation techniques are used. Our contribution to the scientific investigation is to focus on the case of Morocco which has implemented some investment programs in the areas of health and education. We assess whether these education and health expenditures have a positive impact on economic growth in the short and long run.

3. METHODOLOGY ADOPTED AND DATA USED

Below we present the data used and the specification of the econometric model appropriate to the structure of our data.

3.1. Data

The data used for our econometric estimates are derived from a World Bank database of annual time series covering the period from 1990 to 2019. This means that our sample contains 30 observations.

All variables are log-transformed before being introduced into our estimation model. This log transformation offers the following advantages:

- The logarithm minimizes the influence of time effects on the series;
- It reduces the number of steps to reach a stationary series;
- It allows not to lose information on the first values of the series.

3.2. Specification of the Econometric Model

Our econometric model seeks to examine the impact of public spending on human capital on economic growth in Morocco. We start with the Solow growth model from the work of Barro (1999), which incorporates public investment into the production function. This basic model looks like this:

$$Y=F(K,L,G)$$

With;
Y: gross domestic product (GDP);
K: private investment;
L: labor force;
G: public investment.

We focus on public spending on human capital which will be intercepted by public spending on education and health, we will add control variables. The model subsequently specified in linear form is the following:

$$lnGDP_t=\delta_0+\delta_1 lnDEPED_t+\delta_2 lnDEPSAN_t+\delta_3 lnPOAC_t+\delta_4 lnEVI_t+\delta_5 ln\ TMOR_t+\delta_6 lnOUC_t+\mu_t$$

With:
t: 1990,…2019.
ln: the neperian logarithm;
DEPED: Public spending on education;
DEPSAN: public spending on health;
POAC: the labor force;
EVI: life experience;
T*MOR*: the death rate;
OUC: trade openness;
δ_0: the constant; μ: the hazard; δ_1 to δ_6: the parameters that measure the elasticities of GDP with respect to the separate variables.

4. RESULTS AND DISCUSSION

The first step in modeling time series is to examine their stationarity. The results of the stationarity tests allow us to define the appropriate model for estimating the effect of the exogenous variables on the variable to be explained.

4.1. Results of the Stationarity Tests

First, we started with the stationarity test associated with the Augmented Dicky Fuller (ADF). This is one of the most commonly used tests to study time series stationarity in research. The results are displayed in the Table 1.

According to Table 1, the application of the ADF unit root test on the series studied reveals that some variables are not stationary at level. This rejects the stationarity hypothesis for all the series at level. While the series of variables are not stationary at level, we continue to test the variables transformed into first difference. The returned results show that GDP and Commefcial opening were confirmed as stationary after differentiating them once.

Subsequently, no series are incorporated of order two I(2) or more, which is crucial for the application of the econometric specification of the ARDL model in case of a mixture between stationary and non-stationary variables of order (1) containing a single unit root. Indeed, the ARDL model, exhibited by Pesaran and Shin (1999) and further developed by Pesaran et al. (2001), is a method that gathers some advantages. Firstly, it allows the study of both the short and long term effects. Second, it is based on a single equation, so it is easy to use and interpret. Third, it provides better estimates in small sample sizes, notably the case in our sample (30 observations). In this respect, the equation manifests itself in the following form:

$$\Delta y_t = \alpha_0 + \sum_{i=1}^{p} \alpha_{1i} \Delta y_{t-1} + \sum_{n=0}^{q} \alpha_{2i} \Delta x_{t-1} + \beta_1 y_{t-1} + \beta_2 x_{t-1} + \varepsilon_i$$

With: y_t the endogenous variable; x_t the vector of exogenous variables α_{1i} and α_{2i} the short-run effects; β_1 and β_2 the long-run effects Δ in first difference; α_0 the constant; ε_i the hazard.

4.2. Estimation Results of the ARDL Model

By running the ARDL model technique on the variables retained in our specification, we obtain the following results from Table 2.

Among the autoregressive models, various ARDL models admit to be estimated according to the defined number of lags.

Table 1: ADF test of stationarity of variables

Variables	Stationary at level	Stationarity in first difference	Order of integration
GDP		−6,363441***	I (1)
Health expenses	−3,134047*		I (0)
Life expectancy	−5,240576***		I (0)
Commercial opening		−9,457745***	I (1)
Working population	−3,456377**		I (0)
Mortality rate	−5,134481***		I (0)

Source: Developed by the authors from our data using Eviews, ***Significance at the 1% level, **Significance at the 5%

Therefore, we must choose the best model based on the principle of parsimony. This principle is based on the choice of the model that provides the lowest information criterion of Ackaik and Schwars. The Eviews software used in this study allowed us to hold the ARDL model (1, 2, 2, 0, 2, 1, 2) as the best model among the top 20 models. Moreover, the coefficient of determination (R2) is 0.99, confirming that the model fits well. This means that the explanatory variables retained in our econometric estimation contribute to the explanation of about 91% of the variability of the variable to be explained (GDP) (Figure 1 and Table 2 above).

4.3. Bound Test

This test consists of testing the presence of a cointegrating relationship between the variables of the specified model. The originality of this test is that it can be used in case of a mixture between (I=0) that means the stationary variables and (I=1) that means the non-stationary variables containing a single unit root. The test reveals the following results in Table 3.

The principle of this test is based on the comparison between the statistical value of the Pesaran (2001) test with the critical value of the upper bound I(1) and the critical value of the lower bound I(0) for the various significance levels. The test reveals that there is a cointegrating relationship since the statistical value (10.30657) is greater than the critical value of the upper bound I(1) for the different levels of significance as shown in Table 3. Consequently, we accept the hypothesis of the presence of a cointegrating relationship between the variables. In which, we have to extract both the long term relationship and the short term dynamics.

4.4. Short Term Estimation

After the detection of a cointegrating relationship between the variables using the bounds test introduced by Pesaran (2001), we will estimate an error correction model associated with the short term relationship. The estimation results are presented in Table 4.

4.5. Interpretation of the Results of the Short-term Relationship

Table 4 reveals that the the estimates of the short-run relationship reveal that the error correction coefficient is significant (P=0.000) at the 1% level and displays a negative sign (−1.16), which is adequate for the interpretation of the short-run relationship between the variables retained in our specification. In fact, the error correction coefficient of our estimate shows us that the adjustment for an equilibrium and long-run relationship corrects at 116% per year. In

Table 2: Result of the ARDL model (1, 2, 2, 0, 2, 1,2)

Variable	Coefficient	SE	t-Statistic	Prob.*
LnGDP (-1)	−0.15235	0.252001	−0.60456	0.4727
LnDEPSAN	0.112467	0.028968	3.882456	0.0012
LnDEPSAN(-1)	0.023457	0.047639	0.492390	0.4416
LnDEPSAN(-2)	0.131256	0.045611	2.877726	0.0038
LnDEPED	0.039577	0.016562	2.389626	0.0312
LnDEPED(-1)	0.024425	0.008931	2.734856	0.0162
LnDEPED(-2)	0.036153	0.011245	3.215028	0.0021
LnEVI	−16.34681	2.654363	−6.158468	0.0000
LnPOAC	−0.151967	0.262533	−0.984416	0.3655
LnPOAC(-1)	0.516547	0.098110	5.2649780	0.0000
LnPOAC(-2)	0.152116	0.154524	0.0984416	0.2310
LnOUC	0.076748	0.050180	1.5294539	0.0674
LnOUC(-1)	−0.018433	0.057250	−0.3219737	0.6156
LnMOR	−18.46341	2.765753	−6.6757262	0.0000
LnMOR(-1)	12.62810	1.967580	6.4180871	0.0000
LnMOR(-2)	15.34689	1.677580	9.1482313	0.0000
C	42.23570	6.567588	6.4309301	0.0000
R-squared	0.917257	Meandependentvar		10.31389
AdjustedR-squared	0.916408	S, D, dependentvar		0.193133
S, E, ofregression	0.006307	Akaikeinfocriterion		−6.718021
Sumsquaredresid	0.000548	Schwarzcriterion		−5.811641
Loglikelihood	120.6593	Hannan-Quinncriter,		−6.541681
F-statistic	1165.763	Durbin-Watsonstat		2.546413
Prob (F-statistic)	0.000000			

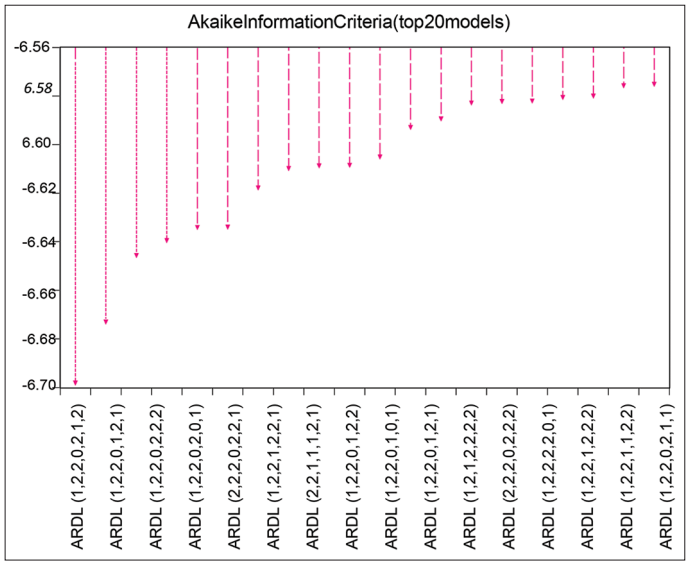
Source: Made by the authors from our data using Eviews

Table 3: Cointegration bounds test

F-bounds test	Value	Null hypothesis: Nolevels relationship		
Test statistic		Signif.	I (0)	I (1)
F-statistic	10.30657	10%	1.89	2.76
k	6	5%	2.56	3.27
		1%	2.96	3.57
		1%	2.77	3.88

Source: Developed by the authors from our data using eviews

Figure 1: Akaike information criterion values for the top 20 models



other words, the results in the table above demonstrate the significant impact of human capital expenditures on the noted economic growth (GDP), even if the sign associated with this effect swings from 1 year to another. Indeed, a 1% increase in health spending generates an 11% increase in GDP and a 13% decrease in GDP the following year. The same is true for education spending, where a 1% increase in spending results in a 2% increase in GDP in the current year and a 4% reduction in GDP in the following year. This finding naturally shows that human capital expenditures are conducive to economic growth in the short term. These findings are consistent with human capital theory and the empirical work of (Bamba et al., 2021). Carrying the meaning of the mutual relationships from 1 year to another, since current human capital expenditures have a greater impact on economic growth than in later years. This is explained by the fact that Morocco has dedicated investments in human capital for the operation of structures and therefore they have more consequences for the long term. Regarding the variables mortality rate and active population have a negative impact on the economic growth in Morocco. On the other hand, trade openness has a positive effect on economic growth in the short run.

4.6. The Long Term Estimation

Next, we estimate the long term relationship whose results are presented in the following Table 5.

4.7. Interpretation of the Results of the Long-run Relationship

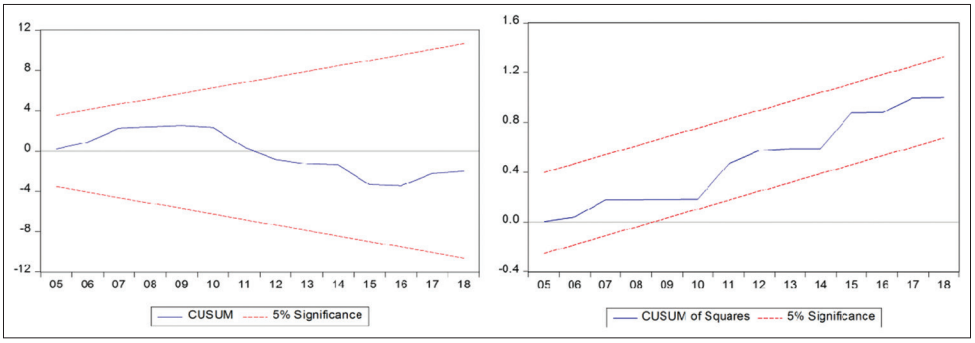
The results of the long-term relationship, presented in Table 5, reveal that the coefficients associated with spending on human capital are significant at the 1% level and positive for economic growth. Indeed, an increase in public spending on education and health respectively leads to an increase in economic growth of 7% and 21% respectively. These results are similar to those found by Bamba et al. (2021) for Mali. This is in contrast to those found by Mohapatra (2017) on the case of India and Issolah et al. (2021) who concluded that there is a negative effect of health spending on economic growth. Regarding work conducted on groups of countries, our results are also appropriate to those guessed by Piabuo and Tieguhong (2017) in their study of the effects of health spending in the CEMAC zone and five other African countries. We find in our own study that the impact of health spending on economic growth is larger than that of schooling spending. This is also revealed by some authors namely (Omitogun et al., 2016). In total, our analysis shows that spending on human capital is positively correlated with growth in Morocco. The optics of these relationships are consistent with the theory of human capital and the model of Lucas (1988). About the control variables, notably the labor force has a significant and positive impact on economic growth in the long run. On the other hand, mortality rate and life experience at birth showed a negative impact on economic growth.

4.8. Tests Appropriate to the Model for Validation

To validate our estimated model and the results obtained from the long term and short term relationships, it is absolutely necessary to verify two properties, namely

- The residuals of the model is white noise in particular, the absence of autocorrelations of errors, homoscedasticity and normality of residuals.
- The stability of the model whose coefficients are stable through the test of CUSUM whose curve must remain within the confidence interval.

Figure 2: Model stability test (CUSUM and CUSUMQ)



Source: made by the authors from our data using Eviews

Table 4: Modeling of the short term relationship

Variable	Coefficient	Std.Error	T-Statistic	Prob
Health expenditure	0.113457****	0.013234	8.573144	0.0000
Health expenditure (-1)	−0.130013***	0.017124	−7.592443	0.0001
Education Expenditures	0.0262456***	0.004223	6.214918	0.0000
Education Expenditures (-1)	−0.041342***	0.004123	−10.02716	0.0000
Working population	−0.161954***	0.032134	−5.039957	0.0009
Working population (-1)	−0.171145***	0.041245	−4.149472	0.0012
Commercial opening	0.080315***	0.018258	4.398893	0.0018
Crude mortality rate	−19.234573***	1.646748	−11.68033	0.0000
Crude mortality rate (-1)	−20.235472***	1.535764	−13.17616	0.0000
CointEq(-1)*	−1.165931***	0.125647	−9.279417	0.0000
R-squared	0.867928	Meandependentvar		0.018103
Adjusted-R-Squared	0.809897	S.D.dependentvar		0.013911
S.E. of regresionn	-0.034034	Akaikeinfocriter		-7.150634
Sum.Squared resid	-0.049252	Schwarzcriter		-6.688057
Log-likelihood	120.7593	Hannan-Quinncriter		-6.999845
Durbien&Waston Stat	2.567413			

***Significance at the 1% level Source: developed by the authors from our data using eviews

Table 5: Modeling of the long term relationship

Variable	Coefficient	SE	T-statistic	Prob
Health expenditure	0.211465***	0.06297	3.358186	0.0034
Education expenditure	0.076387**	0.023764	3.214399	0.0051
Life expectancy	−14.39805***	2.812511	−5.119281	0.0001
Working population	0.447658***	0.129923	3.445563	0.0003
Commercial opening	−0.021193NS	0.074658	−0.283867	0.6750
Mortality rate	−5.289653***	0.741708	−7.131713	0.0000
C	35.67845***	4.426423	8.060334	0.0000

Source: developed by the authors from our data using Eviews. ***Significance at the 1% level **Significance at the 5% level Not Significant: NS

The results of the Table 6 show that the probability of the associated statistic for the three tests is higher than the 5% threshold. This translates the acceptance of the hypothesis H0 for the three tests and consequently it is a white noise. it appears the stability of the coefficients of our ARDL model in the time by the means of the test of CUM.

It appears that the curve of both tests remains within the confidence interval which argues for a stable model according to Figure 2. We can conclude that our estimated ARDL model is robust as a whole.

Table 6: Hypothesis tests of the ARDL model

Hypotheses verified	Test	Statistics	Probability
Independence of residues	Breusch-Godfrey	1.678944	0.1245
Homoscedasticity	Breusch-Pagan	2.788347	0.7457
Normality of the residues	Jarque-Bera	3.004678	0.54

Source: made by the authors from our data using Eviews

5. CONCLUSION

According to the theoretical contributions of the theory of human capital and particularly the theory of endogenous growth, stipulates that the economic growth is strongly correlated with the accumulation of human capital. Indeed, public spending is conducive to economic growth. This article aimed to quantify the impact of public spending on human capital on economic growth. These dedicated expenditures on human capital also reflect the aspect associated with the quality of human capital. The results of both the short-run and long-run ARDL estimates reveal that human capital spending is positive and

significant for economic growth in Morocco. Indeed, in the short run, public spending on human capital is considered favorable to economic growth in the current year and less favorable in subsequent years. This is explained by the fact that little of the public expenditure is allocated to long-term investments. In fact, in the long run, public spending has a positive impact on economic growth in Morocco, and this impact is greater for health spending than for education. It is worth noting that the mortality rate and life expectancy at birth decrease Moroccan economic growth. In contrast, the working population is a strong contributor to economic growth.

In view of these outcomes, economic policies need to recognize the orientation of human capital expenditures toward long-term investments. In fact, this reflects their increasingly minor impact as one moves towards the long term. Moreover, if public spending is directed more towards investments in human capital, this will translate into the quality of human capital including health and education on the one hand, and on the other hand, enhance the value of the labor force through training and employment.

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