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Health capital and economic growth in Mauritania: An ARDL Approach (2002–2021)

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Abstract: This article examines the impact of health capital on economic growth in Mauritania between 2002 and 2021 using the Autoregressive Distributed Lag (ARDL) method. Stationarity tests reveal a combination of I(0) and I(1) integration orders, justifying the use of this model. The empirical results highlight contrasting effects: infant mortality rates, public health spending, and life expectancy negatively influence long-term growth, while trade openness and education have significant positive effects. These results suggest that health policies in Mauritania would benefit from optimization to improve their effectiveness, particularly by reducing structural inefficiencies. Furthermore, the study highlights the key role of education and trade integration as growth drivers. The policy implications call for a rebalancing of public investments in favor of human capital and better governance of health spending.

Keywords: Health capital, economic growth, ARDL, Mauritania, public policy

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1. Introduction

The impact of health capital on economic growth represents a central issue in contemporary development policies. This relationship constitutes a major challenge for public policies, particularly in developing countries where resources are limited and health needs are pressing.

Traditionally, the health sector has been analyzed by public decision-makers from the perspective of expenditure, often perceived as a brake on growth. However, recent developments in economic theory, particularly with the emergence of endogenous growth theory, have repositioned health as a key factor in long-term development.

As a key component of human capital, health influences economic growth through several channels: increasing labor productivity, accumulating skills through prolonged education, and stimulating savings and investment (Bloom et al., 2004).

The report of the WHO Commission on Macroeconomics and Health (2001) also highlights that improving health is not only a fundamental objective of development, but also a powerful lever for reducing poverty and stimulating growth.

Empirical studies on the subject, however, present nuanced results. While most studies (Knowles and Owen, 1995; Bhargava et al., 2001; Bloom et al., 2004) confirm the positive impact of health on growth, others (Acemoglu and Johnson, 2007; Hartwig, 2010) question this relationship, particularly in developed economies. These divergences highlight the need for contextualized analyses, particularly in developing countries such as Mauritania, where the effect of health on growth could be more pronounced.

This article aims to examine the effect of health capital on economic growth in Mauritania, using annual data covering the period 2002-2021 and a robust methodology based on the Autoregressive Distributed Lag (ARDL) model. Our study is distinguished by its integrated approach, which considers not only health indicators such as life expectancy and infant mortality rate, but also key variables such as education, trade openness, and physical capital.

Preliminary results reveal complex relationships. Contrary to expectations, public health spending and life expectancy appear to have a negative effect on long-term growth, while trade openness and education play a positive role. These findings raise important questions about the effectiveness of health policies and their relationship with other development levers.

En contribuant à la littérature existante, cette recherche ouvre des pistes de réflexion sur l'optimisation des investissements en santé dans un contexte de ressources limitées. La suite de l'article est structurée comme suit : la section 2 présente une revue de la littérature, la section 3 détaille la méthodologie, et la section 4 discute des résultats et des implications politiques.

2. Literature review

The economic literature on the impact of health capital on economic growth is extensive and diverse, with results that vary according to geographical contexts, the time periods studied, and the methodologies used.

Several studies have shown that health capital, measured by indicators such as life expectancy or adult survival rate, has a positive effect on economic growth. Knowles and Owen (1995) integrated health capital into the Mankiw, Romer, and Weil (MRW) growth model, showing that it has a robust impact on per capita income, even surpassing the effect of educational capital. Their results, based on 84 countries between 1960 and 1985, highlight the importance of health in growth analyses, especially in developing countries.

Jamison, Lau, and Wang (2004) extended this analysis by examining 53 countries between 1965 and 1990. They found that improvements in health, as measured by adult survival rates, contributed about 11% of economic growth. This study confirms that health is a key factor in growth, particularly in countries with low initial health levels.

Heshmati (2001) also highlighted the positive effect of health spending on economic growth. Analyzing 22 OECD countries between 1970 and 1992, he shows that health spending stimulates growth, with an annual convergence rate of 3.7% for GDP per capita. These results suggest that investments in health are important levers for productivity and growth, especially in developed countries.

Bloom, Canning, and Sevilla (2004) used an aggregate production function approach to examine the impact of health on growth. Their results, based on a panel of countries between 1960 and 1990, show that a one-year increase in life expectancy leads to a 4% increase in output. This study highlights the importance of health in developing countries, where health gains improve labor productivity.

Bhargava, Jamison, Lau, and Murray (2001) examined the impact of health on economic growth using an aggregate production model. Their results, based on 125 countries between 1965 and 1990, show that improvements in health have a positive and significant effect on growth rates, particularly in low-income countries.

However, some studies show that the impact of health capital on growth depends on the economic context and the level of development of countries. Wang (2011) analyzed the link between health expenditure and growth in 31 countries between 1986 and 2007. He shows that the effect of health expenditure varies according to the level of development: in low-growth economies, it can hinder growth, while in medium- or high-growth countries, it contributes positively to it.

Mila Elmi and Sadeghi (2012) found mixed results in their study on developing countries. Using a panel cointegration analysis on 20 countries between 1990 and 2009, they show that economic growth precedes increases in health spending in the short run, but that a long-run relationship exists between these two variables.

Aslan, Menegaki, and Tugcu (2015) explored the impact of health spending on growth in seven industrialized countries between 1980 and 2009. Their results show that health spending has a positive long-term impact, but this impact varies across countries. Bidirectional causality is observed in France, Germany, and England, while unidirectional causality is observed in Italy and Japan.

Finally, some studies challenge the notion that health is always a driver of economic growth. Hartwig (2010) examined the impact of health spending on growth in 21 OECD countries between 1970 and 2005. Unlike previous studies, he finds no evidence of a positive long-term impact. His results even suggest that health spending may have a negative effect on growth in developed economies.

Acemoglu and Johnson (2007) also provided a critical perspective by examining the impact of life expectancy on growth. Exploiting the epidemiological transition of the 1940s, they show that a 1% increase in life expectancy leads to a 1.5% increase in population but has no significant effect on GDP per capita in the short or medium term. This study highlights that health gains do not always translate into increased economic growth, especially in developing countries.

In summary, the economic literature reveals mixed results on the impact of health capital on economic growth. While many studies show a positive impact, especially in developing countries, others highlight negative or no effects, particularly in developed economies. Finally, some studies highlight mixed results, suggesting that the impact depends heavily on the economic context and the level of development of the countries.

3. METHODOLOGY

3.1 Description of the data

Our study is based on the analysis of annual time series covering the period 2002 to 2021. The data used come from the World Bank database (World Development Indicators). We will use log data to determine elasticities.

Table 1: *description of variables used in the study*

Variable	Description	Source
GDP	GDP per capita	World Bank's Database
GHE	Public expenditure on healthcare per capita in dollars	World Bank's Database
IMR	Infant mortality rate	World Bank's Database
LEB	Life expectancy at birth	World Bank's Database
K	Physical capital measured by gross fixed capital formation	World Bank's Database
OPEN	Trade openness: Measured by the ratio of trade (exports + imports) to GDP.	World Bank's Database
EDUC	Education measured by the school enrolment rate.	World Bank's Database

3.2 Estimation methodology

We use time series data to examine the causal relationships between healthcare and economic growth in Mauritania.

3.3 Regression specification

To analyse the effects of health on the promotion of economic growth in Mauritania, our model draws on previous work that has explored the links between health, education, trade openness, physical capital and economic growth. For example, Barro (1991), Bloom and Canning (2000), Frankel and Romer (1999) and Mankiw, Romer and Weil (1992)

The model that will be estimated in this article is as follows:

$$\boldsymbol{LNGDP_t = C + \beta_1 LNLEB_t + \beta_2 LNIMR_t + \beta_3 LNGHE_t + \beta_4 LNK_t + \beta_5 LNOPEN_t + \beta_6 LNEDUC_t + \varepsilon_t}$$

$\boldsymbol{\beta_1, \beta_3, \beta_4, \beta_5, \beta_6} > 0$ **Or** $\boldsymbol{\beta_2} < 0$ **.** $\boldsymbol{\varepsilon_t}$ **is the error term.**

The above model represents the behaviour of economic growth in the long term. The ARDL-ECM model associated with this equation can be written as follows:

$$\boldsymbol{\Delta LNGDP_t = \sum_{i=0}^{p} \gamma_t LNLEB_{t-i} + \sum_{i=0}^{p} \pi_t LNIMR_{t-i} + \sum_{i=0}^{p} \epsilon_t LNGHE_{t-i} + \sum_{i=0}^{p} \rho_t LNK_{t-i} + \sum_{i=0}^{p} \omega_t LNOPEN_{t-i} + \sum_{i=0}^{p} \vartheta_t LNEDUC_{t-i} + \delta ECM_{t-1} + \varphi_t}$$

Where Δ refers to the first difference, and p to the number of optimal lags of the variable.

$\gamma_t, \pi_t, \epsilon_t, \rho_t, \omega_t$ *et* ϑ_t represent the weights of the short-term explanatory variables. δ corresponds to the restoring force towards equilibrium (must be negative and significant).

ECM_{t-1} refers to the remaining term of the long-term relationship delayed by one year. φ_t is the short-term error.

4. RESULTATS AND DISCUSSION

To estimate the model, we use the ARDL (Autoregressive Distributed Lag) method. However, before embarking on this step, it is essential to verify certain hypotheses.

4.1 Stationarity

The results of the Augmented Dickey-Fuller (ADF) unit root test indicate stationarity properties which vary according to the specifications of the model used. The LNIMR variable appears stationary at level (I (0)) in the Trend and Intercept model, while in the Intercept model it requires an initial differentiation to achieve stationarity, thus becoming integrated of order one (I (1)). On the other hand, all the other variables tested are found to be integrated of order one (I (1)) in both specifications, with or without a trend. This combination of integration orders fully justifies the use of an ARDL (Autoregressive Distributed Lag) model.

Table 2 : *Stationarity tests*

Models	Variables	ADF statistic (Level)	ADF statistic (1st differnece)	MacKinnon 5%	MacKinnon 10%	Order of integration
Intercept	LNGDP	-1.503438	-3.659948	-3.012363	-2.646119	I(1)
	LNLEB	-1.272453	-3.515525			I(1)
	LNGHE	-1.615465	-4.294393			I(1)
	LNIMR	-2.532008	-4.182440			I(1)
	LNEDUC	-0.757570	-3.870333			I(1)
	LNK	-1.695135	-4.517603			I(1)
	LNOPEN	-1.944688	-3.627393			I(1)
Trend and Intercept	LNGDP	-2.424082	-3.801458	-3.658446	-3.268973	I(1)
	LNLEB	-0.443890	-3.694362			I(1)
	LNGHE	-2.325233	-3.448430			I(1)
	LNIMR	-7.915921				I(0)
	LNEDUC	-1.839561	-3.795468			I(1)
	LNK	-3.449974	-4.575212			I(1)
	LNOPEN	-1.709644	-3.666923			I(1)

Notes: I(0) means that the variable is stationary in level without differentiation, and I(1) denotes that it has been differentiated only once to make it stationary.

4.2 Bound test

Table (3) below shows the results of the bounds test, which uses standard Fisher's test to assess the cointegration hypotheses. The results show that the Fisher statistic (F = 3.96) exceeds the upper limit of the critical value interval at the 5% significance level. We therefore reject the hypothesis that there is no long-term relationship and conclude that there is a long-term cointegrating relationship for the estimated model. This finding allows us to estimate the long-run and short-run relationships of our ARDL model.

Table 3 : *Bounds test*

F-Bounds Test		Null Hypothesis: No levels relationship		
Test Statistic	**Value**	**Signif.**	**I(0)**	**I(1)**
F-statistic	**3.963639**	**10%**	**1.99**	**2.94**
k	**6**	**5%**	**2.27**	**3.28**
		2.5%	**2.55**	**3.61**

4.3 Optimal lags and ARDL model

The graph below shows the values of Akaike's information criteria for the twenty best models. As can be seen from the analysis, the ARDL model (1, 0, 0, 1, 0, 1, 1) is the most optimal of the 19 other models, as it has the lowest value of the SIC (Figure 1). It follows that the number of lags retained corresponds to the lowest value of the criterion, i.e., no lag was recorded for the LNGHE, LNIMR and LNK variables, while one lag was retained for the other variables.

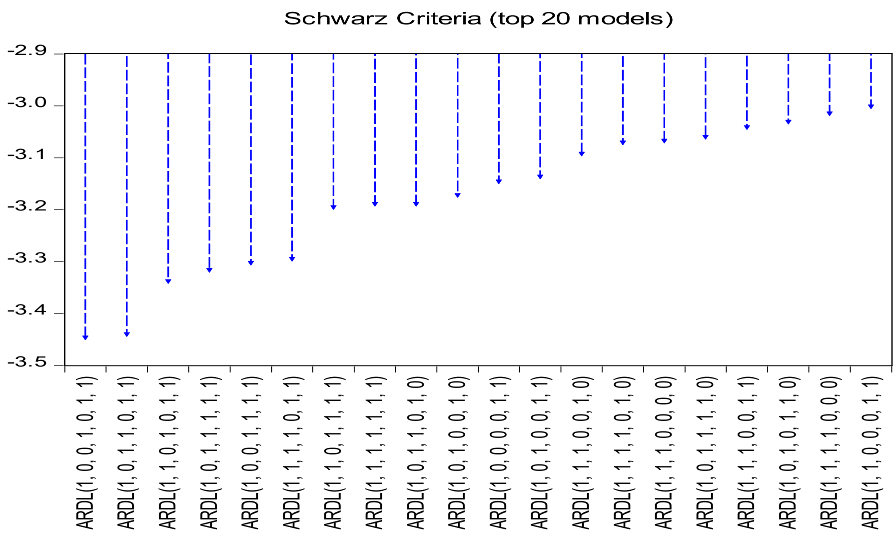

Figure 1: the graph of the Akaike Information Criterion (AIC)

The appendix presents the optimal ARDL model, identified as a function of the number of delays minimizing the Akaike test. The results show that the model is statistically significant, with a probability associated with the F statistic of 0.000029, and an adjusted coefficient of determination (**R2**) of 0.90, indicating a strong relationship between the explanatory variables and the dependent variable. In addition, the Fisher statistic exceeds the critical value at the 5% threshold (2.59), confirming the overall significance of the model. In addition, the Durbin-Watson coefficient, close to 2, validates the good specification of the estimated equation.

4.4 Robustness tests

Table (4) summarises the robustness tests used to guarantee the validity of the model. The LM serial correlation test shows a probability above the critical threshold of 5%, leading to acceptance of the null hypothesis of no error autocorrelation. Similarly, the Ramsey test (RESET) shows a probability greater than 5%, confirming acceptance of the null hypothesis, which indicates that the model is well specified and linear. In addition, the Jarque-Bera normality and heteroscedasticity (ARCH) tests confirm that the residuals are normally distributed and homoscedastic.

Table 4 : *Robustness test*

Statistical tests	Test stat probability	Acceptance Rule: H0	Hypothesis: H0
Ramsey RESET	0.94 (0.36)	Prob > 0,05	The model is well specified
Serial correlation LM	2.46 (0.14)	Prob > 0,05	Uncorrelated errors
ARCH	1.73 (0.20)	Prob > 0,05	Homoscedastic errors
Jarque-Bera	1.10 (0.57)	Prob > 0,05	Residue is normal
Notes: The values in parentheses () are the probabilities associated with the test statistics.			

Finally, the stability of the model was assessed using the CUSUM and CUSUMQ graphical tests. The results show that the curves remain within the corridor delimited by the red dotted line, attesting to the structural stability (Figure 2) and point stability (Figure 3) of the model.

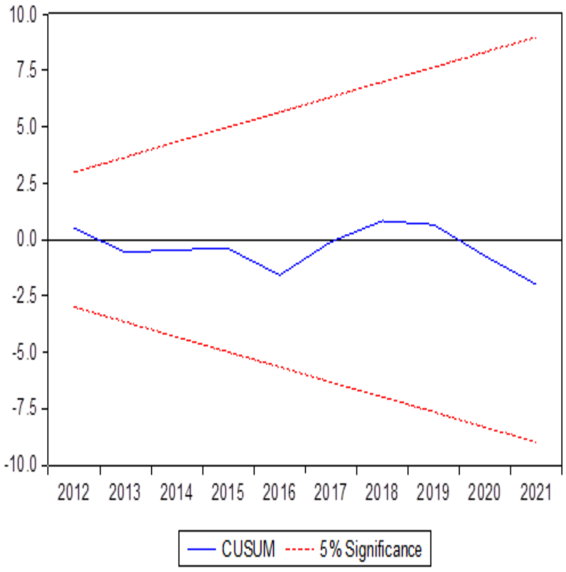

Figure 2 : CUSUM test

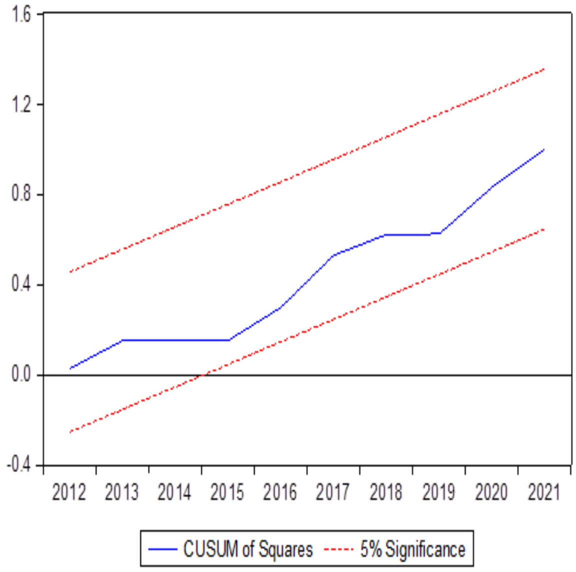

Figure 3: Square CUSUM test

4.5 Long-run coefficients and error correction model

The results presented in Table (5) show that all the variables display statistically significant long-run coefficients, except for gross fixed capital formation (LNK).

***Table 5 :** Log-run coefficients and ECM*

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LNGHE	-0.397190	0.097679	-4.066266	0.0023
LNIMR	-1.594898	0.361165	-4.415978	0.0013
LNLEB	-3.410354	1.742564	-1.957090	0.0788
LNK	0.050772	0.081375	0.623936	0.5466
LNOPEN	0.341443	0.088803	3.844947	0.0032
LNEDUC	0.285716	0.101642	2.810993	0.0184
C	21.59650	7.180680	3.007584	0.0132
ECM = LNGDP - (-0.3972*LNGHE -1.5949*LNIMR -3.4104*LNLEB + 0.0508*LNK + 0.3414*LNOPEN + 0.2857*LNEDUC + 21.5965)				

These estimated coefficients of the long-term relationship highlight that:

- **The infant mortality rate (LNIMR)** has a significant negative effect on economic growth. Indeed, a 1% increase in infant mortality leads to a decrease in GDP per capita of 1.59. This result can be explained by several mechanisms. First, a high infant mortality rate limits the country's human potential, as poor health conditions compromise the training of a skilled workforce, thus reducing innovation and the country's ability to integrate into a knowledge- and technology-based economy. Moreover, high infant mortality hampers the accumulation of capital needed for sustained growth. Increased healthcare spending strains household budgets and reduces their savings capacity, thus limiting the resources available for productive investment. Low savings, however, hinders productive investment, which slows long-term economic development.

- The relationship between government **health expenditure (LNGHE)** and economic growth has been shown to be negative and significant in the long run: a 1-point increase translates into a 0.39-point decrease in GDP per capita. This impact results from several structural factors. A significant portion of the funds may be absorbed by high administrative expenses, excessive operating costs, or inefficiencies linked to corruption and mismanagement, thus limiting their real effect on human capital and productivity. Moreover, the use of debt to finance these expenditures can restrict fiscal space and hamper other strategic investments. Finally, the heavy reliance on medical imports leads to capital flight abroad, thus reducing the expected positive impact of these expenditures on the national economy.

- **Life expectancy (LNLEB)** has a significantly negative impact on economic growth, as indicated by our econometric model: a 1-point increase in life expectancy leads to a decrease in GDP per capita of 3.41 points. Cet impact peut être attribué à plusieurs facteurs. L'augmentation de l'espérance de vie peut entraîner une hausse du nombre de personnes économiquement dépendantes, telles que les personnes âgées inactives et les enfants, ce qui pourrait réduire le revenu par habitant et freiner la croissance à long terme. Furthermore, demographic aging, resulting from increased life expectancy, risks increasing social spending, particularly on pensions and healthcare. If these expenses are not offset by increased productivity, they could put pressure on public finances and slow economic growth. Moreover, a longer-living population could prioritize immediate consumption over savings and investment, which would limit capital accumulation and thus slow growth.
- **Trade openness (LNOPEN)** has a positive impact on economic growth, with a 1-point increase in trade openness leading to a 0.34-point increase in GDP per capita in the long run. This positive effect can be explained by the fact that it strengthens business competitiveness, attracts foreign investment, and allows better access to global technologies and markets. It stimulates innovation, promotes economic diversification, and strengthens the ability to overcome economic crises.
- **Education (LNEDUC)** has a positive impact on economic growth, with a 1-point increase in education leading to a 0.28-point increase in GDP per capita in the long term. Indeed, this effect is explained by the fact that education strengthens productivity by providing the workforce with technical and intellectual skills essential to improving economic efficiency.

This promotes optimal use of resources and increases the competitiveness of business sectors. Moreover, better-trained human capital stimulates innovation, a central element of long-term growth according to endogenous growth theory. Moreover, expanded access to education promotes economic inclusion by reducing inequalities in access to employment and facilitating social mobility, key factors for balanced development.

4.6 Short-run coefficients

Table (5) presents the results of the short-run dynamic coefficients associated with the long-run relationships derived from the ECM equation. The signs of the short-term dynamic impacts are maintained in the long term. However, the coefficient (δ) of the ECM_{t-1} is negative and significant at the 5% threshold, confirming the existence of a long-term adjustment mechanism. The estimated value of the ECM coefficient (-0.93) reflects a rapid adjustment strategy, with around 93% of the imbalance corrected in each period.

***Table 5 :** Short-run coefficients*

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LNLEB)	2.123035	0.940390	2.257611	0.0476
D(LNOPEN)	-0.025513	0.042508	-0.600190	0.5617
D(LNEDUC)	-0.251714	0.074863	-3.362342	0.0072
CointEq(-1) *	-0.935111	0.127364	-7.342036	0.0000

5. CONCLUSION

This study examined the impact of health capital on economic growth in Mauritania using annual data covering the period 2002–2021 and an ARDL methodology to analyze short- and long-term relationships. The results reveal contrasting effects of health indicators on economic growth. In the long run, infant mortality rate, public health expenditure and life expectancy have a significant negative impact on GDP per capita, while trade openness and education exert positive effects. These findings suggest that health policies in Mauritania could be reoriented to improve their effectiveness, particularly by reducing administrative inefficiencies and optimizing resource allocation. Furthermore, the study confirms the importance of education and trade openness as key levers for stimulating economic growth.

The policy implications of this research are twofold: first, it is essential to improve the quality of health spending to maximize its impact on human capital and productivity; second, authorities should strengthen investments in education and promote deeper integration into the global economy. These measures could contribute to more inclusive and sustainable economic growth in Mauritania.

Finally, this study opens avenues for future research, including exploring the mechanisms underlying the observed relationships and extending the analysis to other countries with similar characteristics. Such an approach would allow for a better understanding of the dynamics between health and growth in diverse economic contexts.

REFERENCES

[1] Acemoglu, D., et Johnson, S. (2007). "Disease and Development: The Effect of Life Expectancy on Economic Growth" in Journal of Political Economy, No. 115(6).

[2] Aslan, A. ; Menegaki, A. N. et Tugcu, C. T. (2015). "Health and economic growth in highincome countries revisited: evidence from an augmented production function for the period 1980–2009", in Quality and Quantity.

[3] Bhargava, A. ; Jamison, D. ; Lau, L. et Murray, C. (2001)."Modelling the effects of health on economic growth", in Journal of Health Economics, No. 20(3).

[4] Bloom, D.; Canning, D. et Sevilla, J. (2004). "The Effect of Health on Economic Growth: A Production Function Approach", in World Development, No. 32.

[5] Hartwig, J. 2010. "Is health capital formation good for long-term economic growth? – Panel Granger-causality evidence for OECD countries", in Journal of Macroeconomics, No. 32(1).

[6] Heshmati, A. 2001. "On the causality between GDP and Health Care Expenditure in Augmented Solow Growth Model", SSE/EFI Working Paper Series in Economics and Finance, n° 423, department of Economic Statistics Stockholm school of Economics.

[7] Jamison, D. ; Lau, L. et Wang, J. (2004). "Health's Contribution to Economic Growth in an Environment of Partially Endogenous Technical Progress », Disease Control Priorities.

[8] Knowles, S. et Owen, P. (1995). "Health capital in cross-country variation in income per capita in the Mankiw-Romer-Weil model", in Economic Letters, No. 48.

[9] Knowles, S. et Owen, P. (1995). "Health capital in cross-country variation in income per capita in the Mankiw-Romer-Weil model", in Economic Letters, No. 48.

[10] Mila Elmi, Z. et Sadeghi,S. (2012). "Health care expenditures and economic growth indeveloping countries: panel co-integration and causality", in Middle-East Journal of Scientific Research, No. 12 (1).

[11] OMS. (2001). "Macroeconomics and health: Investing in health for economic development", Report of the Commission on Macroeconomics and Health, Genève.

[12] Wang, K.M. (2011). "Health care expenditure and economic growth: Quantile panel-type analysis", in Economic Modelling, No. 28.

[13] Barro, R. J. (1991). "Economic growth in a cross section of countries", in Quarterly Journal of Economics, No. 106.

[14] Bloom, D. et Canning, D. (2000). "The health and wealth of nations", in Science, No. 287.

[15] Frankel, J., Romer, D., 1999. Does trade cause growth? American Economic Review 89 (3), 379–399.

[16] Mankiw, N.G., Romer, D. et Weil, D. (1992). "A Contribution to the Empirics of Growth", in Quarterly Journal of Economics, No. 107(2).

APPENDIX

Dependent Variable: LNGDP

Method: ARDL
Date: 02/08/25 Time: 16:31
Sample (adjusted): 2001 2021
Included observations: 21 after adjustments
Maximum dependent lags: 1 (Automatic selection)
Model selection method: Schwarz criterion (SIC)
Dynamic regressors (1 lag, automatic): LNGHE LNIMR LNLEB LNK LNOPEN LNEDUC
Fixed regressors: C
Number of models evaluated: 64
Selected Model: ARDL(1, 0, 0, 1, 0, 1, 1)

Variable	Coefficient	Std. Error	t-Statistic	Prob.*
LNGDP(-1)	0.064889	0.206299	0.314537	0.7596
LNGHE	-0.371417	0.094574	-3.927282	0.0028
LNIMR	-1.491407	0.384311	-3.880725	0.0031
LNLEB	2.123035	1.664527	1.275459	0.2310
LNLEB(-1)	-5.312096	2.242292	-2.369047	0.0393
LNK	0.047478	0.074774	0.634954	0.5397
LNOPEN	-0.025513	0.069985	-0.364545	0.7230
LNOPEN(-1)	0.344800	0.097533	3.535200	0.0054
LNEDUC	-0.251714	0.125942	-1.998650	0.0736
LNEDUC(-1)	0.518890	0.149729	3.465540	0.0061
C	20.19513	6.683276	3.021741	0.0129

R-squared	**0.951547**	**Mean dependent var**	**7.293539**
Adjusted R-squared	**0.903093**	**S.D. dependent var**	**0.090581**
S.E. of regression	**0.028198**	**Akaike info criterion**	**-3.993460**
Sum squared resid	**0.007951**	**Schwarz criterion**	**-3.446329**
Log likelihood	**52.93133**	**Hannan-Quinn criter.**	**-3.874719**
F-statistic	**19.63840**	**Durbin-Watson stat**	**2.146278**
Prob(F-statistic)	**0.000029**		

***Note: p-values and any subsequent tests do not account for model selection.**