



THE IMPACT OF LIFE EXPECTANCY ON ECONOMIC GROWTH IN DEVELOPING COUNTRIES

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ABSTRACT

Will the improvement of life expectancy contributes to economic growth in a country? The response to this question is essential in the debates on health policy in the world in general and in developing countries (DC) in particular. The objective of this study is the impact of life issue through an analysis of the impact of life expectancy on the growth of Gross National Income (GNI) per capita in DC. Using a dynamic panel of 141 DC over the period 2000- 2013, the study concludes that the improvement in life expectancy positive affects economic growth in DC. However, the results are mixed when classifying DC according to their level of income. We observe that the effect is not significant in the middle-income DC.

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JEL Classification: C33, 188, 040, 057.

Contribution/Originality

This study contributes in the existing literature by using another estimation methodology in panel data: dynamic panel. This estimation methodology helps to address the endogeneity issue. The findings indicate that economic growth is positively affected par life expectancy

1. INTRODUCTION

Since the development of the new growth theory in the late 1980s made by some authors (Romer, 1986; Lucas, 1988; Barro, 1990; Aghion and Howitt, 1992), it is disassembled that human capital plays a key role in economic growth in a country (Barro and Sala-i-Martin, 1992; Barro, 1997; Acemoglu and Johnson, 2007; Madsen, 2012). One of the important components of the capital is good health. Improving the health and the life expectancy, allow the accumulation of

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knowledge and skill. People in good health live longer and are much more likely to invest in education. They are therefore more productive and contribute to the national income, job creation (Deaton, 2001; Weil, 2005). Conversely, people in poor health have a low ability to learn and adapt to technological innovations within and therefore are less productive (Fogel, 1994; Madsen, 2012).

This link between improved health and economic growth has generated enthusiasm in DC. Indeed the debt crisis of the 80s that experienced by DC and panaceas implemented by donors as part of structural adjustment programs have led to these countries to withdraw from the social sectors (health, education, etc). This result in a reduction in public funding essential to the accumulation of human capital and improving the living conditions of the populations in most DC. During this same period, DC that have implemented structural adjustment programs have experienced chute growth of GPD per capita (CEA, 2013).

The failure of structural adjustment program (SAP) led DC to reconsider their development policy through their re-engagement in their social sector, particularly in the field of health. Health policies are now the object of particular attention in the context of the millennium development goals (MDG) through the objectives 4, 5, and 6. In this context, it seems appropriate to take an interest on the impact of health on economic growth in DC.

The purpose of this paper is to contribute to the literature on health as a factor of economic growth by analyzing the effect of improved health through gains in life expectancy on economic growth in DC.

The rest of this article is organized as follows: The second section is devoted to the review of the literature. The third section presents the economic model, variables and the source of data. The fourth section presents the empirical results and section five concludes and proposes economic policy measures.

2. REVIEW OF THE LITERATURE

In this section, we will in the first step do a brief review of theoretical literature before presenting in a second step the results of some empirical studies.

In theory, the role of health on economic growth is ambiguous because it has two effects: positive direct and negative indirect effects.

The direct effect is analyzed through the endogenous growth models. In this context, the work of Barro and Sala-i-Martin (1992), of Acemoglu and Johnson (2007) and Madsen (2012) will introduce health as a major source of income growth. Two types of models can be distinguished. First, those who view health as a component of human capita. Then those who consider health as a central variable of economic growth. In these models, improving health causes labor productivity and encourages people to invest in human capital. The lengthening of life expectancy translates into more long-term investment in education and in a greater accumulation of knowledge for each individual. These models also show that, over the cost of low health care, most people tend to increase other productivity investments.

The indirect effect is highlighted by the neoclassical and Keynesian theories. Neoclassical theory emphasizes the harmful effects of the public funding on economic growth. For the improvement of health requires significant public funding care and consequently an increase in government levies and slowdown in economic activity. Moreover, in the Keynesian Framework, in the increase of saving rate due to the improvement of life expectancy results in a depressive effect on economic activity by reducing aggregate demand.

Empirically, the impact of health on economic growth may be at the micro and macro economics levels. At the macro level and from the seminal article of Barro and Sala-i-Martin (1992), several studies have analyzed expectancy on economic growth. Barro (1996) shows, using a sample of 84 countries that improved the life expectancy of 10% leads to a GDP growth of 0.52% to 0.62%. From 104 countries panel data using a convergence approach, Bloom *et al.* (2001) establish that an increase of one year of life expectancy leads to a growth of 2.6 to 4% of GDP. By the same logic, Bloom and Sachs (1998), Gallup *et al.* (1999), Bloom *et al.* (1999), Lorentzen *et al.* (2008) show that an increase in life expectancy has a positive effect on economic growth. Aghion *et al.* (2012) establish a positive and significant relationship between life expectancy and growth. The three authors reach a conclusion that an initially high level of life expectancy and rapid improvement of the latter have a significantly positive impact on the GDP per capita.

On the contrary Acemoglu and Johnson (2007) cannot find a positive relationship between the improvement of life expectancy at birth and income growth. The result of their study tends rather to show that the innovations in the field of health accelerate the growth of the population and therefore cause lower per capita income. Similarly, using the data in reliable income countries, the results obtained leave Barro and Lee (2010) show a negative relationship between life expectancy and economic growth. Finally, at the micro economic level, Schultz and Tansel (1992), Strauss and Thomas (1998), Schultz (1999a), Schultz (1999b), Savedoff and Schultz (2000), Schultz (2002), show that health has a positive impact on the economic growth through the increase in worker productivity.

3. METHODOLOGY AND DATA SOURCE

Our methodological approach adopts both a descriptive statistical approach and econometric approach. It follows that of Acemoglu and Johnson (2007) in which the Gross National Income (GNI) per capita is expressed as function of the life expectancy and other control variables such as capital, human capital and Governance.

$$\ln rnb_{it} - \ln rnb_{it-1} = (\beta_0 - 1) \ln rnb_{it-1} + \beta_1 \ln caphumain_{it} + \beta_2 \ln esp_{it} + \beta_3 \ln capital_{it} + \beta_4 \ln gov_{it} + \delta_i + \lambda_t + \varepsilon_{ijt} \quad (1)$$

Where the rnb variable and esp denote respectively GNI per capita and life expectancy. Other control variables as $caphumain$, $capital$, and gov represent human capital, gross fixed capital formation and good governance respectively. The parameters δ_i , λ_t et ε_{ijt} represent the specific

countries effect, time specific effects and error term identically and independently distributed. The symbol \ln represents the natural logarithm and the letters i and t represent respectively the countries index and time index. The data used are all from the same source: World Bank (World Development indicators). Human capital is captured by the percentage of workers with an educational level of high school. Capital is Gross Fixed Capital Formation (GFCF). Good governance is measured by the index of transparency accountability and corruption. The index ranges from 1 (low) to 6 (high). The life expectancy at birth in turn is the total number of years that an individual must live in a country. From the prediction of theories of endogenous growth (Barro and Sala-i-Martin, 1992; Acemoglu and Johnson, 2007), it is expected that, the life expectancy, human capital and good governance positively affect the growth of GNI per capita.

The data cover 141 DC classified according to their income level (low, intermediate and high) and cover the period 2000 – 2013. The choice of DC is justified by data availability while that of the study period is justified by the fact that it was during this period that many DC have experienced significant changes in their GDP and life expectancy.

4. EMPIRICAL RESULTS

Data analyses reveal that the lowest life expectancy is 41.78 years, while the highest is 79.84 years. Low-income DC have low performance in terms of life expectancy at birth. While high-income DC recorded strong performances. Hence the existence of a positive correlation between life expectancy at birth and GNI per capita (Figure 1)

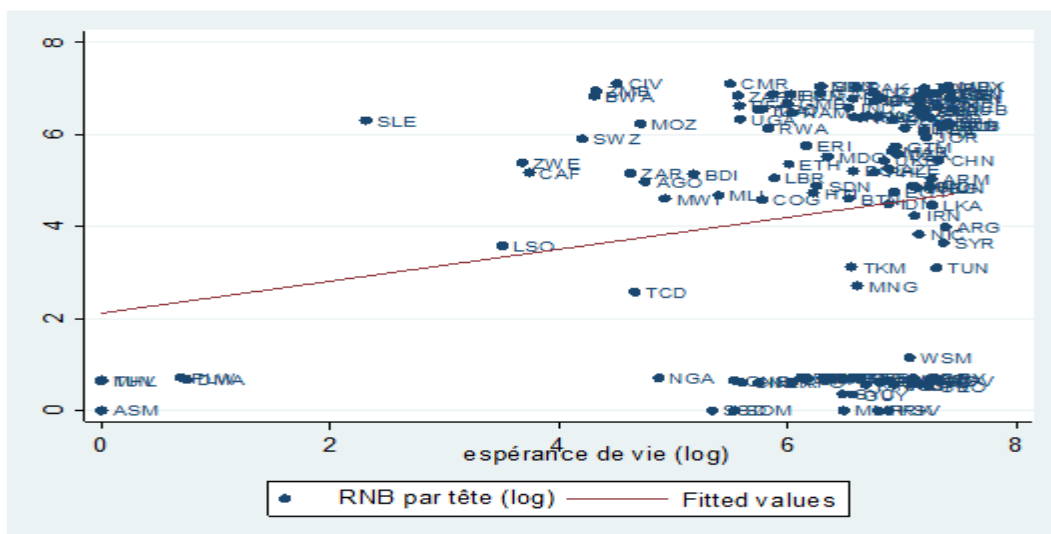


Figure-1. Life expectancy and GNI per capita (average for the period 2001 – 2010)
 Life expectancy (log)
 GNI per capita (log)----- Fitted values

Source: The author from World Bank data

This result seems confirmed by the results of the econometric estimate of the equation (1) (table 1). FE, VI and GMM columns denote the regression result obtained by fixed effects model, instrumental variable method and generalized method of moments (GMM) respectively.

The choice of the model with fixed effect compared to the random effect model is guided by the Hausman test. The results show that the life expectancy at birth positively and significantly affects the GNI per capita. Thus, an improvement in the life expectancy at birth of 10% results in a growth of GNI per capita of 1.3%. This result is consistent with that obtained by [Aghion et al. \(2012\)](#). Similarly, the capital also affects positively and significantly GNI per capita.

To take into account the problem of endogeneity due to reverse causality and the omission of important explanatory variables; respectively, we use the method of instrumental variable (IV) and generalized method of moments (GMM). GNI per capita in turn may explain the improvement in life expectancy at birth. Not taking into account the reverse causality problem can lead to biased results. It is for this reason that we have instrumented expectancy of life at birth by the level of infrastructure in each country. The Rationality is that, more a country has excellent infrastructures, the more people's living conditions improve (see figure 1a appended). The level of infrastructure is approximated by the logistic performance index, which ranges from 1 (poor performance) to 5 (high performance).

Table-1. Regressions in total sample

	FE	IV	GMM
Life expectancy	0.138 (0.031)***	0.216 (0.127)*	0.103 (0.034)***
Gouvernance	0.055 (0.083)	0.091 (0.060)	0.086 (0.089)
Capital	0.651 (0.046)***	0.763 (0.023)***	0.799 (0.093)***
Human Capital	0.018 (0.034)	0.010 (0.041)	-0.014 (0.038)
Middle income		-0.612 (0.131)***	-0.444 (0.224)**
High income		0.070 (0.118)	0.122 (0.246)
GNI per initial capita			-0.849 (0.062)**
Dummy 2008			oui
Constante	0.648 (0.182)***	-0.049 (0.643)	-0.202 (0.296)
Adjusted R-Squared	0.5	0.7	.
Observations	1,946.00	1,862.00	1,729.00

*, ** and *** indicate significance at the level of 10%, 5%, 1% respectively ; The values in parentheses are the standard deviations
Sources: Authors' calculations

The results of IV and GMM estimates confirm those obtained by the fixed effect model. Moreover, we observe that the coefficient of GNI per capita is significantly negative initial (column GMM), which confirms the convergence hypothesis emitted by the growth model. Introducing

dummies group of countries shows that the growth of GNI per capita is lower in middle-income DC than in low incomes DC. Which leads us to test the robustness of our econometric estimates by classifying according to DC income and on the basis of the classification of the World Bank.

For simplicity, we selected three groups: DC with low income (GNI per capita of less than or equal to 975 US Dollars), middle income DC (GNP per capita between 976 and 11 906 US Dollars) and finally the PED high income (GNP per capita exceeds 11 906 US Dollars). The results of the econometric estimates are contained in table 2.

We see that life expectancy positively and significantly affects the growth of GNI per capita in DC with low-income and high-income DC. Moreover the coefficient in both groups of countries showing an improvement in life expectancy at birth of 10 % leads an increase of 1.2 % of GNI capita. Contrary, the effect is not significant in the middle income countries. This last result is similar to [Acemoglu and Johnson \(2007\)](#) who find no empirical evidence between the improvement in life expectancy at birth and income growth.

Table-2. Regressions by country group

	Low. Income	Middle. Income	High. Income
GNI per capital	-0.654 (0.169)**	-0.159 (0.094)***	-0.892 (0.087)***
Life expectancy	0.124 (0.066)*	0.035 (0.054)	0.124 (0.045)***
Gouvernance	-0.093 (0.143)	0.081 (0.130)	0.155 (0.246)
Capital	0.619 (0.177)***	0.917 (0.141)***	0.745 (0.141)***
Human Capital	-0.070 (0.081)	-0.094 (0.057)	0.044 (0.071)
Dummy année_2008	oui	oui	oui
constant	-0.311 (0.426)	-0.629 (0.420)	0.092 (0.552)
Adjusted R-Squared	.	.	.
Observations	429.00	598.00	702.00

*, ** and *** indicate significance at the level of 10%, 5%, 1% respectively ; The values in parentheses are the standard deviations

Sources: Authors' calculations

5. CONCLUSION

The debate of health policy in DC also concerned many policy makers and researches. Our study tries to make some contributions to the debate through an analysis of the impact of improved life expectancy on economic growth in DC. The main innovation of our approach is that it uses dynamic panel method. The main result shows that the improved life expectancy increases the growth of GNI per capita. However, when the sample breaks classifying DC according to their income level, we observe that the effect is not significant in the middle-income DC.

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Appendix

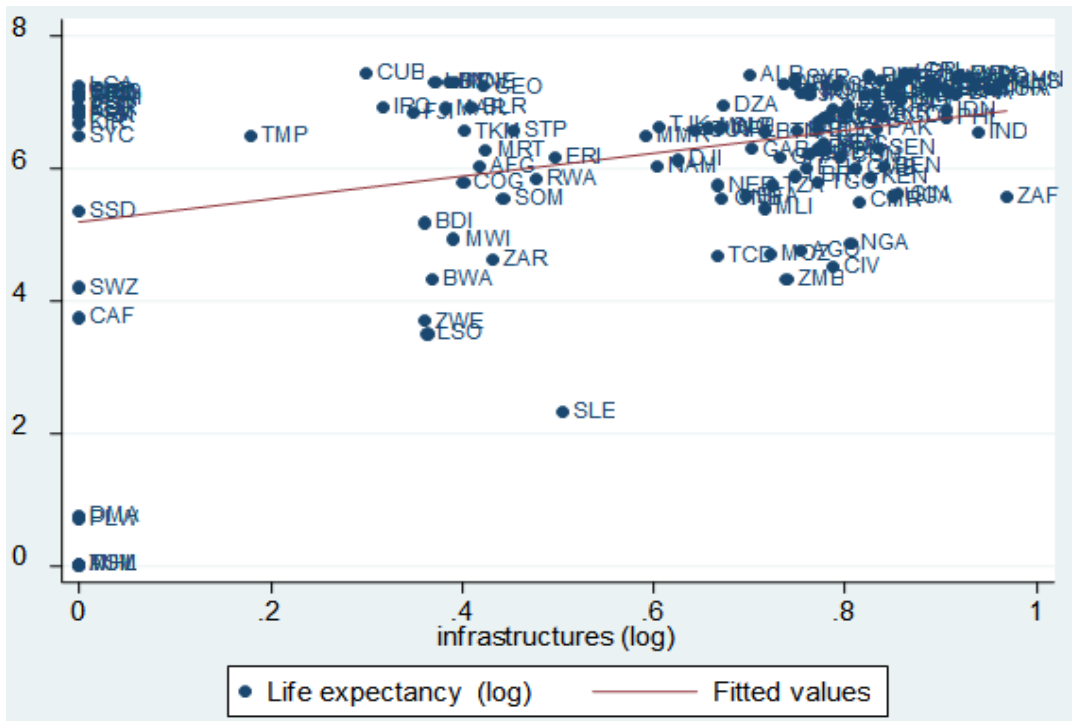


Figure 1-a. Life expectancy and GNI per capita (average for the period 2001– 2010)

Source: The author from World Bank data

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