International Journal of Econometrics and Financial Management, 2020, Vol. 8, No. 2, 66-72
Available online at http://pubs.sciepub.com/ijefm/8/2/4
Published by Science and Education Publishing
DOI:10.12691/ijefm-8-2-4

Impact of Health Spending on Economic Growth: Case of France

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Received October 10, 2020; Revised November 11, 2020; Accepted November 18, 2020

Abstract This paper intends to shows that health expenditure is a fundamental determinant of economic growth of every nation and that increasing expenditure on health leads to higher growth rates. For this reason, we empirically validated the impact of health spending on economic growth in France. Hence, we have found that health spending has a positive impact on economic growth, that is to say, any increase in this spending generates an augment in French economic growth. Also, we deduce that France must further improve the health insurance system and raise health care spending, given its importance for economic growth and well-being.

Keywords: *health expenditures, economic growth, econometric model*

Cite This Article: Chrigui Zouhair, Mgadmi Nidhal, and Sadraoui Tarek, "Impact of Health Spending on Economic Growth: Case of France." *International Journal of Econometrics and Financial Management*, vol. 8, no. 2 (2020): 66-72. doi: 10.12691/ijefm-8-2-4.

1. Introduction

Since the end of the Second World War and precisely since the fifties and sixties, with the period of the "golden age of growth", the state of health of the populations of the industrialized countries did not stop improving. This progress, sometimes very rapid, has constantly provoked new needs aroused by the supply of care goods and services; determined by health systems, economic and social policies, but also based on individuals and their behavior.

The fifties and sixties were also marked by the disappearance of major scourges such as sleeping sickness, plague, smallpox and by a strong reduction in other ailments. However, foci of yellow fever, cholera, cerebrospinal meningitis still appear here and there. We note the resurgence of certain sexually transmitted diseases, in particular AIDS.

The links between health, poverty reduction and economic growth are much closer than is generally believed. The burden of disease in some low-income regions, particularly sub-Saharan Africa, is a formidable barrier to economic growth [31]. The AIDS pandemic is an incredible challenge, which, by its urgency and its intensity, has no precedent. This epidemic alone risks compromising the development of Africa for an entire generation.

One of the fundamental relationships between health and the economy is that the quality and quantity of the workforce increases as health improves, which affects production in different economic sectors. In addition, a healthy working population can make better and more efficient use of technology, machinery and equipment. In short, healthier individuals can produce more output per hour worked. Human capital theory postulates that it is through the improvement of workers' productivity that human resources contribute to economic growth. By improving the health of workers, their skills and their dexterity, human capital creates a set of factors favorable to the production process.

In sum, the disease impedes economic growth and development in three main ways. The first is the most direct: preventable diseases reduce the number of years of healthy life expectancy.

The economic losses to society caused by truncated lives due to the combination of premature death and chronic disability are phenomenal: economic growth will slow by several percentage points as individuals in the prime of life age succumb. The second way is by the effect of the disease on the investment made by parents to children. Societies with high infant and child mortality rates (deaths of children under the age of 15) have high fertility rates which partially compensate for frequent child deaths, but large numbers of children make families poor less able to invest widely in health and education for all of them.

The third way is by the reducing effects of the disease on the products of investments in companies and equipment, which go beyond the efforts on the productivity of each worker. Entire industries in agriculture, mining, manufacturing and tourism may be threatened by a high prevalence of the disease. In addition, epidemic and endemic diseases may also jeopardize social cooperation and even macroeconomic stability, [31].

This work is structured around three parts. In the first part, we will synthesize the theories of the impact of

health on economic growth. In the second part, we will present the main empirical works on the relationship between health and economic growth. The last part will correspond to an empirical validation of the effect of health on economic growth for the case of France.

2. Health Theory and Economic Growth

Kuznets (1973) considered that modern economic growth reflects a permanent capacity to offer an increasing population an increased quantity of goods and services per inhabitant. [26] define economic growth as the increase in the inflation-adjusted market value of the goods and services produced by an economy over time. Statisticians conventionally measure such growth as the percent rate of increase in real gross domestic product, or real GDP.

Growth is usually calculated in real terms - i.e., inflation-adjusted terms - to eliminate the distorting effect of inflation on the prices of goods produced. Measurement of economic growth uses national income accounting. Since economic growth is measured as the annual percent change of gross domestic product (GDP), it has all the advantages and drawbacks of that measure.

The "rate of economic growth" refers to the geometric annual rate of growth in GDP between the first and the last year over a period of time. This growth rate represents the trend in the average level of GDP over the period, and ignores any fluctuations in the GDP around this trend.

Research on economic growth has taken off again thanks to the work of [24] and [21]. Thus, it was then necessary to develop a model where long-term per capita growth is no longer indexed to exogenous variables as in neo-classical models, but where it is explained by internal variables to the economic model. Their models are thus qualified as endogenous growth models. In these models, growth can continue indefinitely because the return on investment in a category of capital goods (including human capital) does not decline as the economy grows. The dissemination of knowledge among producers and the external benefits of human capital are part of the growth process by hindering diminishing returns to capital. The returns on capital are then constant and allow growth to be sustained. In fact, one could think of increasing returns to capital, but then the economy risks experience explosive growth, a phenomenon whose effects can be very unfavorable to development.

[13] presented health as a durable good and integrated it into a general model of household consumption and investment. All economic agents inherit human capital, which tends to depreciate at an increasing rate with age. However, [13] viewed the individual in part as a producer of his own health. He has optimized his income and consumption during his life by fighting against this depreciation through his preventive attitudes, by devoting time to it and by using care. This optimization is done under time and income constraints.

There are two sub-models. One considers health as an investment to increase production and earning capacity.

The demand for health is then a demand derived from the general demand for well-being. This reasoning applies well to adolescents and the active population from an individual perspective. At the collective level, it escapes it in the zones affected by unemployment where a part of the working age population can remain at the same time unoccupied and in bad health without effect on the economy.

The second sub-model considers health as pure consumption: it improves the utility derived from life and from other consumption. This analysis applies in a general model where individual and collective consumption are at the same time other durable goods, current consumption, but also personal life. The pure consumption optic applies to the inactive and in particular to the retired. [2] sought to analyze how economic growth and health interacted theoretically; health being an essential component of human capital, investments in health have direct and indirect effects on productivity and consequently on economic growth.

3. Review of Empirical Literature

Health care extends life. Over the past half century, Americans have spent a rising share of total economic resources on health and have enjoyed substantially longer lives as a result. Debate on health policy often focuses on limiting the growth of health spending.

[26] We investigate an issue central to this debate: can understand the growth of health spending as the rational response to changing economic conditions notably the growth of income per person? [26] estimate parameters of the technology that relates health spending to improved health, measured as increased longevity. They also estimate parameters of social preferences about longevity and the consumption of non-health goods and services. The story of rising health spending that emerges is that the diminishing marginal utility of non-health consumption combined with a rising value of life causes the nation to move up the marginal-cost schedule of life extension. The health share continues to grow as long as income grows. In projections based on our parameter estimates, the health share reaches 33 percent by the middle of the century.

The relationship between health expenditures and economic growth is the subject of a large literature. [4] investigated the effects of health indicators on economic growth rates between 1965 and 1990 in developed and developing countries. It was found that there is a positive but weak relationship between health and economic growth. [5] extended production function models of economic growth, to account for work experience and health, for a panel of countries observed every 10 years from 1960 to 1990.Their result is that health has a positive and statistically significant effect on economic growth.

[28,29] investigated whether health is one of the determinants of economic growth. They concluded that high growth leads to investments in human capital and thus, health advances. [8,9] examined the relationship between health and economic growth using a sample of 104 countries over the period 1960-1990. The results from non-linear two-stage least squares estimates (2SLS) show that good health had a positive and statistically significant effect on economic growth. They equally highlighted that the life expectancy effect in growth regressions appeared to be a real labor productivity effect, other than life expectancy acting as a proxy for workers experience.

[16] analyzed channels associated with the influence of the health of the country on growth performance with the Schumpeterian growth theory. This paper emphasizes the importance of maternal and child health on the critical dimensions of human capital. In the same year, Andre [1] used a sample of 52 countries classified by continents: 13 European countries, 12 African countries, 16 American countries and 11 Asian countries to examine the impact of health on economic growth over two periods: 1970-1980 and 1980-1990. They made use of ordinary least square (OLS) regression and discovered that health capital had a significant effect on economic growth, especially with a variable that captures all the determinants of health.

[15] suggest that health care expenditure is the rational reaction of an economic system to a continuous growth in income. They conclude that the reduction rate of marginal utility in consumption is more significant than that of the returns of medical productivity. Using panel data from the European Community Household Panel, [28,29] find that in most countries, the income elasticity of health was positive and increases with income and that income growth was not pro-rich in most EU countries, thereby resulting in small or negligible reductions in income inequality.

[2] investigated the relationship between health care expenditures and economic growth in Nigeria. Their results using the ordinary least square multiple regression showed a significant and positive relationship between health care expenditure and economic growth. They recommended that Nigerian policy makers should continuously increase the percentage of budget allocated for health every year. [7] examines the long-run relationship between the health expenditure and GDP based on the panel Co-integration analysis and it was concluded that the share of health expenditures to GDP decreases with GDP.

The effect of income on health expenditure for a panel of 31 Organization for Economic Cooperation and Development (OECD) countries was analyzed in [20]. The estimations results were shown that the long-run income elasticity is close to unity, that health expenditure is more sensitive to per capita income cyclical movements than to trend movements, and that the adjustment to income changes in those countries with a higher share of private health expenditure over total expenditure is faster. Through a study of Co-integration and causality between health spending and economic growth, [6]. The findings revealed that there is a long-run causality from public spending on health to economic growth while it is not observed any short-run causality.

Recently, [18] concludes that life expectancy and health care expenditure have a significant positive impact on GDP both in the short-term and in the long-term. Similarly, hehave shown that in general, the direct impact of government health expenditures on economic growth in Turkey is positive and significant and its indirect impact is negative and significant. [9] examines the relationship between income and health expenditures for a panel of emerging markets in Europe and Middle East African and Asian countries over the period from 1995 to 2013.

The empirical results using a modified version of the [12] causality test proposed by [19], and [11] have indicated that income is an important factor in explaining the difference in healthcare expenditures among countries. Therefore, it appears that increases in income level stimulate healthcare expenditures for some of the emerging market economies.

More Recently, [22] reviews the application of the Abuja declaration of 2001, 15 years after signatories to this declaration accepted to allocate 15% of government expenditure on health. As of 2013 only five African countries had more than 15% of government expenditure allocated to the health sector.

This paper compares these five countries with countries the CEMAC region where no country meets the required target. Based on a Co-integration and causality analysis, Results shows that thus increase in general level of income can stimulate increase in health expenditure. This highlights the potential of the impact of a healthy labor force for CEMAC region on economic growth.

4. Empirical Validation

The econometric model synthesizes the general deficit in health insurance as a function of the share of consumption of healthcare & medical goods in economic growth in France and the share of current health expenditure on France's gross domestic product. This model is an extension of [23] model. The latter has shown in his work that the annual increase in health spending at a faster rate than GDP results from a recurring deficit in the general health insurance scheme. We will refer to [23] model to identify the impact of health spending on growth and on the social security sickness deficit. This basic model can be presented in non-linear form below:

$$DEF_t = A(X_t)^{\alpha}(Z_t)^{\beta}\exp(\varepsilon_t) \quad \forall\ \text{t:1978} \rightarrow 2016$$

With DEF: represents the deficit of the general health insurance scheme, Xt: corresponds the share of consumption of healthcare & medical goods in economic growth measured by the ratio of consumption of healthcare and medical goods to GDP, Zt: denotes the share of current health care expenditure in economic growth in France approximated by the ratio of current health care expenditure to economic growth in France and: the random variable or the error term which fits the non-explanatory variables.

The three variables in the model are taken from the World Bank, the International Monetary Fund and the Central Bank of France. The database covers the period from 1978 to 2016. In order to estimate this model by appropriate techniques, it turns out to be necessary to linearize this model above by integrating the logarithmic operator on the right and to the left:

$$DEF_t = Log(A) + \alpha(X_t) + \beta(Z_t) + \varepsilon_t \quad \forall\ \text{t:1978} \rightarrow 2016$$

Where Log: corresponds to the natural logarithm and Log (A): represents the average effect of the omitted or hidden variables. The table below represents the descriptive statistics of the variables in this model.

Table 1. Descriptives Statistics

	Mean	Median	Std Deviation	Skewness	Kurtosis	Jarque-Bera	Probability
DEF	-2703.47	-1417.6	3748.981	-0.9387	3.0202	4.8469	0.0886
CSBM/PIBF	7.6494	7.9868	0.8888	-0.2326	1.9220	1.8953	0.3876
DCS/PIBF	10.0585	10.1911	0.7603	0.0765	2.0587	1.2503	0.5351

The standard deviations of the two explanatory variables are very small. Hence, it is a good adjustment of the ratio consumption of care & medical goods on economic growth in France compared to its average. In addition, the ratio of current expenditure on care to GDP in France has a good adjustment compared to its right of adjustment. On the other hand, the linear adjustment of the deficit variable in the general health insurance scheme is very poor compared to its average.

From the absolute dispersion indicator, we can see that the approximations of these two explanatory variables are very good. However, the identification of the endogenous variable is poor.

The endogenous variable of this model does not follow the normal law since; the Jarque-Bera statistic is significant. On the other hand, the two explanatory variables follow the normal law because the statistics of Jarque-Bera are lower than the tabulated value of Chi-square at two degrees of freedom. We will test the stationarity of the different variables of the reference model from the [9]. The table below shows the unit roots test for these variables.

Table 2. Dickey-Fuller Test (1979-1981)

	In level			In first difference		
Variables	DEF	CSBM/PIBF	DCS/PIBF	DEF	CSBM/PIBF	DCS/PIBF
Lags	3	2	1	3	2	1
Model	M1	M3	M1	M1	M3	M1
T-Statistics	-0.4499	-2.9908	3.1520	-3.6566	-4.5352	-3.2823
Critical Value 5%	-1.952	-3.562	-1.951	-1.952	-3.568	-1.952

M1 : without constant and without trend
M2 : With constant Without trendand
M3: With constant and trend.

From this table, we note that the [9] test is applicable only for the variable current care expenditure on economic growth in France because the optimal number of lags for this variable is equal to one. We find that the T-Statistics of this variable are higher in level than the critical value of [22].

This variable contains a unit root and the difference effect is still necessary in order to stabilize this variable. DCS / PIBF stationarity is ensured after a single differentiation. Also, we find that the endogenous variable (DEF) has a unit root detected by the [23] since, the T-Statistics is higher in level than the critical value of [9] and after a only differentiation this variable becomes stationary. Thus, the ratio of consumption of healthcare & medical goods to GDP in France is integrated on the order of one based on the [23].

This test of unit roots shows that all these variables are integrated of order one and we will use the theory of Co-integration in order to avoid the existence of spurious relations for these variables.

We will study the existence of a long-term relationship of the deficit of the general health insurance scheme in relation to these two ratios and the adjustment of this deficit within an error correction model from of the uni-varied and multi-varied co-integration theory. We will use the double-step method of [12] to estimate this long-term relationship using the ordinary least squares (OLS) procedure. The result of this relationship is summarized in the table below.

Table 3. The long-term relationship of this deficit

Variable	Coefficient	Std. Dev	T-Statistics	Significance
CSBM/PIBF	1.5136	0.6982	2.1677	0.0382
DCS/PIBF	0.7750	0.66267	1.16949	0.077
Constant	1.6035	0.5852	2.9424	0.0062

The estimation of the long-term relationship by OLS gives expected and significant results for the two explanatory variables. Hence, the ratio of consumption, care & medical goods to economic growth in France has a positive and significant effect on the deficit of the general insurance scheme.

This ratio is highly elastic compared to the endogenous variable, that is to say, this ratio makes it possible to inflate the deficit of the general insurance scheme. On the other hand, the ratio of current expenditure to GDP in France is less sensitive compared to the deficit in the general health insurance scheme since the coefficient of this ratio is positive and significant at the risk threshold of 10%.

The average effect of the omitted variables has a positive and significant impact on the endogenous variable. This relation is accepted under the restriction of stationarity in terms of the residue of this relation. The table below corresponds to the residue stationarity test.

Table 4. Resid stationarity

Resid (DEF)	
Optimal number of lags	1
Nature of the test	DF
M1	Without constant and without trend
T-Statistics	-2.7435
Critical value at 5%	-1.9516

The residual of the long-term relationship is stationary in level since the T-Statistics is lower than the critical value of [9] at the risk threshold of 5%. We accept this Co-integration relationship and we will study the linear dynamics of health spending on economic growth in France within an ECM model. The table below will present this ECM.

Table 5. Study of the linear adjustment by the ECM model

Variable	Coefficient	Std. Dev	T-Statistics	Signifiance
Δ DEF_{t-1}	0.1730	0.1890	0.9153	0.3684
Δ $CSBM/PIBF_t$	-3.2086	1.7630	-1.8337	0.0782
Δ $CS/PIBF_t$	-5.6737	2.7295	-2.2837	0.0308
$Resid_{t-1}$	**-0.4051**	**0.2163**	**-1.8724**	**0.0724**
Constant	6.0276	3.6852	2.0113	0.0548

We note that the deterministic dynamics of the ECM model have negative and significant signs. The deviation from equilibrium has a negative and significant coefficient. Hence, a linear adjustment brings the target of the general health insurance plan deficit back to a partially stable situation.

The imbalance of this deficit is corrected to around 40.5147% by the French authority in the form of familiar allowances and social benefits.

We deduce that the deterministic dynamics of the ECM model have negative and significant signs. The deviation from equilibrium has a negative and significant coefficient. Hence, a linear adjustment brings the target of the general health insurance plan deficit back to a partially stable situation.

The imbalance of this deficit is corrected to around 40.5147% by the French authority in the form of familiar allowances and social benefits. We will study the multivariate adjustment of the deficit of the general insurance scheme in relation to its basic value within an error correction vector model (VECM). For this, we will use the tests of [14] to identify the number of co-integration relationships. The table below corresponds to the tests of [14].

Table 6. Johansen tests (1995)

	Test λ_{trace}			Test $\lambda_{\max}$			
DEF CSBM/PIBF DCS/PIBF							
Null Hypothesis	r=0	r≤1	r≤2	r=0	r=1		r=2
Alternative Hypothesis	r≥1	r≥2	r≥3	r=1	r=2		r=3
Statistical Value	31,33	13,92	0,43	17,41	13,49		0,43
Critical value at 5%	29,68	15,41	3,76	20,97	14,07		3 ,76
				DEF	CSBM/PIBF	DCS/PIBF	Constante
Vecteur Co-intégrant normalise par DEF				1	-0,9327	-0,1192	-0,7837

From this table, we note that there is only one Co-integration relation detected from the trace test and the test of maximum eigenvalues. We will use the maximum likelihood technique to estimate the Co-integral matrix and the adjustment matrix. The table below represents the estimation by the maximum likelihood method of the VECM model.

Table 7. VECM model estimation

Variables	Standardized co-integrating vectors (matrice β)	Error correction coefficients (matrice α)
DEF	1,000	-0, 1152
CSBM/PIBF	-0,9327	0, 0045
DCS/PIBF	-0,1191	-1,0120

From this table, we can see that the two explanatory variables exert positive influences on the increase in the deficit of the general scheme of health insurance, but the impact of the ratio of consumption of care and medical goods on French wealth is more remarkable for this deficit than the ratio of current health expenditure to economic growth in France. The speed of adjustment brings the target of this deficit back to a partially stable situation because the strength of the recall for this one has a negative and significant sign.

The econometric investigation shows the existence of a significant relationship between health spending and economic growth in France. This growth is explained by the improvement in the standard of living and the introduction of new medical techniques. In this regard, [30] concluded that the increase in health care expenses makes it possible to increase medical equipment &work force, to improve the method of remuneration of doctors and medical technical progress. From an economic point of view, the consequences of an increase in health spending tend to be positive.

It generates an increase in gross domestic product and employment in the short, medium and long term. This increase has long-term beneficial effects on growth and well-being in terms of premium reductions, which make it possible to offset the differences in financial burden between households.

5. Conclusion

With regard to the growing interest in examining the importance of health spending in the economy, in particular the French economy.

These expenditures become a major component of economic growth. In this article, we have studied the impact of health spending on economic growth in France during the period 1978-2016. After synthesizing the different theoretical approaches describing the role of health on exogenous & endogenous growth, we illustrated some empirical works on the effects of health on economic growth.

We have extracted a database from the World Bank, International Monetary Fund and the Central Bank of France on the deficit of the general health insurance scheme, on the ratio of consumption of healthcare and medical goods to French wealth and on the ratio of current health expenditure to gross domestic product in France. We studied the quality of fit with respect to the mean, the normality, the asymmetry and the flattening of this deficit and these ratios using statistical indicators of position, dispersion and shapes.

We empirically validated the existence of a long-term linear relationship of this deficit with respect to these two

ratios from the univariate and multivariate Co-integration theory. For this, we referred to the [29]) and we verified that this deficit and these two ratios are integrated of order one.

We found that the deficit in the general health insurance scheme increased with these two ratios from the double-step procedure of [12] and we verified the existence of a linear relationship that links this deficit against these ratios. We accepted this relation with the restriction of the stationarity in level of the residue.

We have noted that the target of this deficit converges to a partially stable long-term situation within an error correction model. Health spending has a positive impact on economic growth, that is to say, any increase in this spending generates an increase in French economic growth. These expenditures undergo a linear adjustment within a VECM model since the speed of adjustment of the endogenous variable takes a negative and significant sign, that is to say there is a corrective term, which brings these expenditures back to its fundamental value.

Finally, France must further improve the health insurance system and increase health care spending, given its importance for economic growth and well-being. Indeed, as a consumer good, health allows individuals to increase their well-being and the freedom to fulfill their desires. In other words, it enables them to earn income on the labor market. The long-term effects of changes in health spending are considerable on labor productivity and economic growth.

This research explores the association of public health expenditure with economic performance across the France. Healthcare expenditure can result in better provision of health opportunities, which can strengthen human capital and improve the productivity, thereby contributing to economic performance. It is therefore important to assess the phenomenon of healthcare spending in a country.

The on the whole results strongly suggest a positive correlation between healthcare expenditure and the economic indicators of income, GDP, and labor productivity. While healthcare expenditure is negatively associated with multi-factor productivity, it is positively associated with the indicators of labor productivity, personal spending, and GDP. The study shows that an increase in healthcare expenditure has a positive relationship with economic performance.

There are also variations across states that justify further research. Building on this and prior research, policy implications include that the good health of citizens indeed results in overall better economy. Therefore, investing carefully in various healthcare aspects would boost income, GDP, and productivity, and alleviate poverty. In light of these potential benefits, universal access to healthcare is something that warrants further research. Also, research can be done in countries with single-payer systems to see if a link to productivity exists there. The results support arguments against our current healthcare system's structure in a limited way

Acknowledgements

We would like to thank all reviewers for their comment and remarks for developing our research.

References

[1] Andrés Aguayo-Rico, Iris A. (2005). Empirical Evidence of the Impact of Health on Economic Growth. Issues in Political Economy, Vol. 14, p. 1-17.

[2] Bakare A.S and Olubokun Sanmi (2015), "Health Care Expenditure and Economic Growth in Nigeria: An Empirical Study", Journal of Emerging Trends in Economics and Management Sciences (JETEMS) 2 (2): pp 83-87.

[3] Bras and Pierre-Louis (2009), "La création des agences régionales de santé: notre système de santé sera-t-il encore mieux gouverné?" Droit social, novembre, n°11, pp. 1126-1135.

[4] Bhargava A et al.(2001), "Modeling the effects of health on economic growth", Journal of Health Economics, 20: 423-440.

[5] Bloom D, Canning D and Malaney P. (2000), "Demographic change and economic growth in Asia", Population and Development Review, 26: pp257-290.

[6] Boussalem, F. Boussalem, Z. and Taiba, A. (2014), "The relationship between public spending on health and economic growth in Algeria: Testing for co-integration and causality", Instanbul 9th International Academic Conference, pp. 143-160.

[7] Courreges c. and lopez a. (2011), "Les ARS, un an après : l'espoir, l'ambition et les vicissitudes de l'action", Droit social, n°11, pp. 1112-1117.

[8] David EB, David C and Jaypee S. (2004), "The Effect of Health on Economic Growth: A Production Function Approach", World Dev J Great Brit; 32(1):pp 1-13.

[9] Dickey David A. et Wayne A. Fuller, (1979), "Distribution of the Estimators for Autoregressive Time Series with a Unit Root", Journal of the American Statistical Association, 74, pp 427-431.

[10] Dickey, D.A., and Fuller, W.A. (1981), "Likelihood Ratio Statistics for Autoregressive Time Series with a Unit Root," Econometrica 49, pp 1057-1072.

[11] Dolado, J. J., & Lütkepohl, H. (1996). Making Wald tests work for cointegrated VAR systems. Econometric Reviews, 15(4), 369-386.

[12] Engle Robert F. et Clive W. J. Granger (1987), "Co-Integration and Error Correction: Representation, Estimation, and Testing", Econometrica, (55) 2, pp 251-276.

[13] Grossman Sanford J., Merton H. Miller (1988). Liquidity and Market Structure NBER Working Paper No. 2641 (Also Reprint No. r1117) July 1988.

[14] Johansen Søren (1991), "Estimation and Hypothesis Testing of Cointegration Vectors in Gaussian Vector Autoregressive Models Econometrica, Econometric Society, vol. 59(6), pages 1551-1580, November.

[15] Hall, R.E. and Jones, C.I., (2007), "The value of life and the rise in health spending", Quarterly Journal of Economics 122 (1), pp 39-72.

[16] Howitt, P., (2004), "Endogenous growth, productivity and economic policy: a progress report", International productivity monitor, pp 3-15.sector Autoregressive Models", Econometrica, 59, pp 1551-1580.

[17] Pierru F (2012), "Des idéaux pour la santé ?", Santé Enjeux Visions Equilibres, n°37.

[18] Kurt sedrar. (2015), Government Health Expenditures and Economic Growth: A Feder-Ram Approach for the Case of Turkey. June 2015 International Journal of Economics and Financial Issues 5(2): 441-447.

[19] Kuznets Simon. (1973), Modern Economic Growth: Findings And Reflections American Economic Review, 1973, vol. 63, issue 3, 247-58.

[20] Lago-Penas and S. C.-P.-F. (2013), "On the relationship between GDP and health care expenditure: a new look", Economic Modelling,, 32, pp124-129.

[21] Lucas, Robert E. (1988). "On the Mechanics of Economic Development," Journal of Monetary Economics, 22, 3-42.

[22] MacKinnon, J.G. (1991), "Critical Values for Cointegration Tests, "in R.F. Engle and C.W.J. Granger (eds), Long-Run Economic Relationships, Oxford, Oxford University Press.

[23] M. Mehrara, M. Musai. (2016), "Granger causality between economic growth in oil exporting countries", Interdisciplinary Journal of Research in Business, Vol. 1, Issue. 8, pp 103-108.

[24] Romer P. (1986), Increasing Returns and Long Run Growth, Journal of. Political Economy, vol 94, octobre, n°5.

[25] RE Hall, CI Jones (2007). “The value of life and the rise in health spending - The Quarterly Journal of Economics, vol 122, issue 1, pp 39-72.

[26] Serap Bedir, (2016). Healthcare Expenditure and Economic Growth in Developing Countries. *Advances in Economics and Business*, 4(2), 76-86.

[27] Terleckyj, N., (1980), «Direct and Indirect Effects of Industrial Research and Development on the Productivity Growth of Industries», in J.W. Kendrick and B. Vaccara, eds., New Developments in Productivity Measurement, NBER, Studies in Income and Wealth, Chicago, University of Chicago Press, n°44.

[28] Toda, Hiro Y. (1995). Toda Finite sample performance of likelihood ratio tests for cointegrating ranks in vector autoregressions. Econometric Theory, 11 (1995).

[29] Van de poel, E., O’donnell, O. and Van doorslaer, E. (2007), "Are urban children really healthier? Evidence from 47 developing countries", Social Science and Medicine, in 65(10), pp 1986-2003.

[30] Van zon A. H and Muysken J. (1997), "Health education and endogenous growth", Journal of Economie Literature n° 36.

[31] Yannick L'Horty & Alain Quinet & Frédéric Rupprecht, (1997) "Expliquer la croissance Économie et Prévision, Programme National Persée, vol. 129(3), pages 257-268.

[32] World Health Organization. (2017) Global Health Expenditure database. Available at: http://apps.who.int/nha/database.