

Study of the Relationship Growth-Health-Poverty Empirical Validation for the South Shore Country The Mediterranean

Majdi Mekdem

University of Sousse
Faculty of Economic Sciences and Management of Sousse
mejdimidmm@yahoo.fr

Abstract

This paper aims to study from empirical observations interaction between health and economic growth to reduce poverty. To investigate this question, a model of simultaneous equations was developed to endogenous economic growth and to assign the quality of poverty. Using data from a sample of five countries on the southern shore of the Mediterranean during the period 1992-2014, the results provide evidence of a positive association between health and economic growth on the one hand, and a positive association between improvement health and poverty reduction on the other. Thus, the total impact of life expectancy on poverty is equal to - 0.705 sum of the direct and indirect impact. We improve life expectancy by 10% resulting in lower rates of poverty -7.05%.

Furthermore, equation (1) shows that increasing the index that measures income inequality a unit causes an increase in poverty in an amount equal to 0.82. Similarly the equation (2) shows that the increase in inequality of a unit may induce GDP growth decreased -1.08 which means that even the influence of income inequality n' is also limited to its direct effect on poverty, but also incorporates indirect impact linked to the evolution of GDP. We notice a total impact of income inequality on poverty reduction. According to the calculation any increase in the index of inequality of income 10% results in a rate of increase in poverty by 9.7%. We also note that improving health is the indispensable vehicle for poverty reduction.

Keywords: economic growth, health, poverty, life expectancy, Income inequality, simultaneous equations, panel data.

JEL Classification: C23, I15, O14, O52, O55



Introduction:

Reducing poverty is now one of the major priorities of all institutions concerned with human development. According to the report on Human Development 1996, prepared by the United Nations Development Program (UNDP), while 21% of people in developing countries are below in terms of income poverty line, 37 % suffer from poverty in terms of human capacity. "Short-term progresses without human development are possible, but they will not be sustainable without further growth. Conversely, economic growth is not sustainable without human development. Says Richard Jolly; Special Adviser to the UNDP Director.

The emphasis today on the health economics is representative of the awareness of the International community of the strong correlation between health and development and between poverty and health. Indeed, of the eight Millennium Development Goals (MDGs), three call for

specific improvements in the area of health by 2015: to reduce infant mortality, reducing maternal mortality and slowing the spread of HIV/AIDS, malaria and tuberculosis.

Back of poverty, is an investment in health because it is an important vehicle for economic development. As shown macroeconomics Committee of the United Nations health "MC", a significant improvement in the health status is a prerequisite for countries to break the cycle of poverty. Indeed promoting health worldwide is a challenge to save humanity. Health for all without discrimination seems like a utopia as a key objective, the foundation of human development. What prior link between health and economic development and what points this factor could reduce poverty in countries North & South shores of the Mediterranean.

To answer these questions we need a first theoretically clarify the many relationships between health and economic development, health and poverty. On a second empirically investigate the relationship between the growth triangle, health and poverty

1. The interaction between health progress and economic development: a review of the theoretical literature:

Many relationships between growth and progress in health are the subject of controversy both theoretical and empirical among economists. Note the existence of a correlation between the levels of lives, as measured by GDP in purchasing power parity and health levels.

At the micro level, the health status of individuals influences their productive capacity.

- Strauss and Thomas (1998) show a link between health and productivity, which is closely linked, the link between nutrition and productivity. In different countries we observe a positive relationship between, on the one hand, the stature and body mass index of individuals and, secondly, their salaries. A link also exists between these indicators and the participation of individuals in the labor market. Similarly, a negative relationship was found, particularly in Africa, between the prevalence of certain diseases such as bilharzias or anemia and productivity of farmers. The health status can influence economic performance also through more indirect channels.
- According to Bloom and Canning (2000), better health and longer life expectancy are all incentives to invest in education, whose returns are then mechanically higher. Other work by the World Bank in Africa show that the conditions of nutrition and child health improve enrollment and school performance and reduce absenteeism of children in school.
- Bloom and Canning (2000) suggest that greater longevity led to an increase in savings, necessary to cover the needs of individuals beyond the age of retirement.
- Ram and Schultz (1979) conclude that mortality decline creates a powerful incentive to improve the education of individuals at all ages.
- (Preston (1975), Deaton (2001), Smith (1999) and Wang et al. (1999) show the existence of a correlation between the decline in mortality rates and economic growth.
- Easterlin (1998) shows that economic growth is positively correlated with the mortality decline. Conversely economic development can improve the conditions of health. Obviously, poor households cannot meet the expenses of medicines and access to relevant health services to deal with diseases.

Various researchers have recently contributed to the analysis of the relationship that might exist at the macro level, between economic growth and the improvement of health conditions, using appropriate econometric methods to control risks of interpretation error direction of causality between variables.

- Barro (1996) performs work that bears respectively 80, 87 and 84 countries for the periods 1965-1975, 1975-1985 and 1985-1990, using a linear regression along lagged values of certain variables. The variables used are those of Health (logarithm of life expectancy and the share of public expenditure on health), the rate of secondary and higher education, the logarithm of the GDP weighted by the enrollment of men, the fertility rate and the terms of trade. It was found that

the effect of increasing the life expectancy of 5 years on the growth rate is 33% with a coefficient of 0.042.

- Barro and Sala-i-Martin (1995) found that about five years of life expectancy increases the growth rate of 46%. They worked on the 1965-1975 and 1975-1985 periods and 87 and 97 countries. Their method is called "Seemingly Unrelated Regression (SUR)", they used life expectancy, public spending on health and education, and they used the rate of investment, political instability, measured by the number of strokes State and foreign trade.
- Bhargava et al. (2001) had tested the effect of health indicators such as ASR: the adult survival rates on economic growth. They used the ASR (probability of surviving the 60 th birthday after reaching the age of 15 years). The empirical results confirm the positive correlation between ASR and economic growth is higher in poor countries than in others. For example for the underdeveloped countries, an increase in the TCS of 1% is associated with increased growth rate of 0.05%.
- Weil (2004) shows that health is a result and a determinant of income. People that are benefited of good health are better qualified and are able to work more laboriously, and are more productive. And the health of the population of a country is an important determinant of its economic success. Weil used as a health indicator. The average height of adult men, BMI (Body Mass Index), the rate of adult survival (ASR) for men, and age of menarche (menstruation beginning) in women.
- Weil (2004) showed that the variation in health has a great effect on the change in output per worker. Using the age of menarche, health explain 7.7% of the variation in GDP per worker. Using the rate of adult survival Health explains 11.1% of the variation in GDP per worker. These variations in health are an important source of variation by country income.
- Bloom and Canning (2005), using international comparative data on the five-year period from 1965 to 1995, show that there is an influence of improved health conditions, as measured by a variable that approximates the adult survival rates, on economic growth. They conclude that an increase in adult survival rate of 1 percentage point increase in labor productivity of 2.8%, with a confidence interval of 95% between 1.2% and 4.3%.

2. Relationship between health and poverty: a review of the theoretical literature

Referring to the document "poverty and health" (Wagstaff, 2001), empirical studies examining the relationship between poverty and health show four essential points.

- The first shows that the health situation is unfavorable to the poor. They die younger and sicker than the rich.
- The second shows that inequalities appear more observed in disadvantaged in terms of poor health indicators such as malnutrition and mortality.
- The third is that these inequalities vary from country to country.
- The fourth is that the socioeconomic inequalities in health seem to get worse and not fade, both in poor countries than in developed countries.

The poor have more malnutrition, illiteracy, infant mortality and low life expectancy. The differences in the levels of health outcomes between countries with low and middle income countries (LMIC) and high-income countries (PRE) are enormous. Taking the example of several countries in sub-Saharan Africa in 1000 children, 200 die before their fifth birthday. Compared to Sweden the mortality rate for five years is currently 5 per 1,000 births. It is found that the infant mortality rate is usually higher in poor countries. And poor health is seen as a major dimension of poverty. The poverty alleviation has become the preferred task of international organizations and of the institutions.

In 1990 the World Bank and mainly since the publication of its latest report on the development in the world (World Bank, 2000) showed that among the essential dimensions of poverty include the health status and the risk of being poor health. And to reduce poverty, it may be sufficient not to increase income, if parallel, it does not improve health. Therefore to reduce the

health gap between rich and poor is not just part of a goal to fight against poverty: this opens a fight for social justice and equity.

Another dimension focused on equity and health shows a vital link with poverty. We should not only promote health itself. Of Aristotle's claim that health allows us to flourish as human beings' (Gillon, 1986), but it is also an asset that we need to develop studies and to achieve.

For poor health is essential. It must therefore be kept to draw hasty results on the effect of measures targeted health only. The poor can only rely on their health to produce and consume, while the rich use to a greater extent their human and financial capital. Logically, poor health is linked to poverty and there may chance that this correlation disappears in the absence of specific measures against poverty.

Until now, much of the literature is used for health aspects related to equity and poverty. It focused on health inequalities between rich and poor. Yet another approach to ensure that health is a separate dimension of poverty or welfare and must be based to improve the state of health of the entire population at that low point of view, regardless of income. The best way to protect the principles of justice and equity, possibly of reducing health inequalities between individuals, regardless of their income, or concentrate on individuals who bear a poorer health, they rich and poor in terms of revenues.

3. The variables included in the analysis

In this section and in a first equation interest in an indicator Health life expectancy and know the effect of this variable reduction of poverty. So our model regresses as follows: an explained variable is poverty based on the following variables:

3.1. Variable explained

Poverty as measured by per capita consumption expenditures over the period 1990-2012.

The explanatory variables are:

- a) **Gross domestic product per capita:** Gross domestic product (GDP) is an economic indicator used to measure production in a given country. It is defined as the total value of the production of wealth (value of created goods and services - value of goods and services destroyed or transformed during the production process) in a given country in a given year by economic agents residing within the national territory. It is also the measurement of income from the production in a given country. Sometimes called annual economic output or just output.
- b) **Life expectancy at birth (LE):** The number of years a newborn could live if normal mortality at birth should be the same throughout his life.
- c) **The Income inequality (INQ):** aim the disparity between the incomes of individuals 'rich' and those of individuals "poor."

In a second equation

The dependent variable is the Gross domestic product per capita

The explanatory variables: Is Life expectancy at birth income inequality as already mentioned for other variables such as:

The enrollment rate (ER): it is the ratio of total enrollment (regardless of age) to the corresponding age population officially at the level of education. We consider the enrollment in primary, secondary and higher education.

Health expenditure per capita (current US \$) (HE):

Total health expenditure is the sum of public and private health expenditures as a ratio of the total population. It includes the provision of health services (preventive and curative), family planning activities, activities related to nutrition and using health emergency reserved but excludes the provision of water and services hygiene. Data are in current US dollars.

4. Empirical model and specification

To investigate empirically the relationship between growth, health and poverty, we specify a basic econometric model that consists of a series of two equations describing the behavior of poverty and economic growth. In particular, the model is an equation of poverty and the growth equation. The first endogenous variable in the model is poverty, as measured by per capita consumption expenditures over the period 1990-2012. We introduce in equation Poverty a set of control variables that are commonly used as factoring explanation of poverty: income inequality to capture the kind of income distribution, growth in per capita GDP to capture economic development and the variable expectancy life as a health indicator.

The second endogenous variable in the model is economic growth, which is measured as the average of gross domestic product (GDP) per capita during the same period of growth. The specification of the growth equation is as follows:

$$\text{LogPOV}_{it} = \delta_0 + \delta_1 \text{logGDP}_{it} + \delta_2 \text{logLE}_{it} + \delta_3 \text{logINQ}_{it} + \epsilon_{1it} \quad (1)$$

$$\text{LogGDP}_{it} = \gamma_0 + \gamma_1 \text{logLE}_{it} + \gamma_2 \text{logINQ}_{it} + \gamma_3 \text{logER}_{it} + \gamma_4 \text{logHE}_{it} + \epsilon_{1it} \quad (2)$$

The total effect of life expectancy on poverty can be determined when the variable drift poverty with respect to the variable life expectancy. This is equal to:

$$\frac{\text{derived logPov}}{\text{derived logLE}} = \delta_2 + \delta_1 \frac{\text{derived log GDP}}{\text{derived logLE}} = \delta_2 + \delta_1 * \gamma_1 \quad (3)$$

In the same way, the total effect of income inequality on poverty is calculated if the variable poverty is derived from the variable income inequality. Wich is equal to:

$$\frac{\text{derived logPov}}{\text{derived logINQ}} = \delta_3 + \delta_1 \frac{\text{derived log GDP}}{\text{derived logINQ}} = \delta_3 + \delta_1 * \gamma_2 \quad (4)$$

4.1. Descriptive Statistics

Table 1: Descriptive Statistics

POV	Average	Median	Minimum	Maximum
	73.112	78.023	32.181	89.554
	SD	CV.	Asymmetry	Ex. Flattening
	15.148	0.20719	-1.4229	1.0413

LE	Average	Median	Minimum	Maximum
	69.947	70,000	62,000	76,000
	SD	CV.	Asymmetry	Ex. Flattening
	2,922	0.0417	-0.549	0.0062
GDP	Average	Median	Minimum	Maximum
	2814.29	1825.00	626,000	14802.0
	SD	CV.	Asymmetry	Ex. Flattening
	2444.46	0.868589	2.29986	6.41483
HE	Average	Median	Minimum	Maximum
	228.442	207,000	66.0000	525,000
	SD	CV.	Asymmetry	Ex. Flattening
	116.091	0.508185	0.923332	0.243860
INQ	Average	Median	Minimum	Maximum
	49.226	50.898	38.338	55.284
	SD	CV.	Asymmetry	Ex. Flattening
	4.5701	0.092840	-0.66413	-0.68357
ER	Average	Median	Minimum	Maximum
	73.9789	81.0000	42.0000	86.0000
	SD	CV.	Asymmetry	Ex. Flattening
	13.7524	0.185895	-1.30311	0.0551570

Author's calculations

4.2. The estimation methods

We believe in this part the entire system above equations and find γ_1 , γ_2 , δ_1 , δ_2 and δ_3 that allow us to verify if and how life expectancy and inequality affect poverty reduction.

4.3. Estimation results countries on the southern shore of the Mediterranean

Table 2: Growth Indeed, life expectancy and income inequality on poverty reduction

Variables	The POV	LGDP
LGDP	(-0.14605) ***	-----
LLE	(-0.326034) ***	(2.75727) ***
LINQ	(0.826153) ***	(-1.08182) ***
LER	-----	(0.684392) ***
LHE	-----	(0.788675) ***

(*) Meaning the risk by 10%

(**) Meaning at risk of 5%

(***) Meaning the risk of 1%

Table 3: Impact of life expectancy on poverty

	Direct impact of life expectancy on poverty	Indirect impact of life expectancy on poverty	Total impact of IE on poverty
Coefficient	δ_2	$\delta_1 * \gamma_1$	$\delta_2 + \delta_1 * \gamma_1$
Estimated coefficient	-0.32	2.75* -0.14	- 0705

Author's calculations

Table 4: Impact of income inequality on poverty

	Direct impact of income inequality on poverty	Indirect impact of income inequality on poverty	Total INQ impact on poverty
Coefficient	δ_3	$\delta_1 * \gamma_2$	$\delta_3 + \delta_1 * \gamma_2$
Estimated coefficient	0.82	(-0.14) * (- 1.08)	0.971

Author's calculations

5. Implications and conclusion

Regarding health, we found that although life expectancy affects both the reduction of poverty. Equation (1) shows that increasing life expectancy by a unit t reduces poverty by an amount equal to -0.32. However, equation (2) shows that the improvement in the life expectancy of a unit can also induce an increase in GDP by an amount equal to 2.75 which means that the effect of the change in life expectancy by a unit is not limited to its direct impact on poverty, but also includes the indirect impact via a channel of economic growth. Thus, the total impact of life expectancy on poverty is equal to - 0.705 sum of the direct and indirect impact. We improve life expectancy by 10% resulting in lower rates of poverty -7.05%.

Furthermore, equation (1) shows that increasing the index that measures income inequality a unit causes an increase in poverty in an amount equal to 0.82. Similarly the equation (2) shows that the increase in inequality of a unit may induce GDP growth decreased -1.08 which means that even the influence of income inequality n ' is also limited to its direct effect on poverty, but also incorporates indirect impact linked to the evolution of GDP. We notice a total impact of income inequality on poverty reduction. According to the calculation any increase in the index of inequality of income 10% results in a rate of increase in poverty by 9.7%

We note the obvious effect of life expectancy that confirms the positive effect of lengthening the life of household savings, investment, economic growth and consequently the reduction poverty.

Similarly the adverse effect of income inequality on poverty than can be explained by the negative correlation between health status of the population measured by life expectancy and income inequality. And finally we find that income inequality discriminates the state of health of the population. This health deterioration negatively affects economic growth and therefore poverty increases.

References

- [1] Barro. 2000. "International Data on Educational Attainment. Updates and Implications" Working Paper no. 42. Harvard University Center for International Development, Cambridge, MA.
- [2] R. Barro, and X. Sala-I-Martin. 1995. *Economic Growth*. New York: McGraw-Hill.
- [3] A. Bhargava, D. Jamison, L. Lau, and C. Murray. 2001. "Modeling the Effects of Health on Economic Growth." *Journal of Health Economics* 20 (3): 423-40.
- [4] D. E. Bloom, and D. Canning. 2000. *Science* 287 (5456) "The Health and Wealth of Nations." 1207-1208.
- [5] D.E. Bloom, D. Canning, and B. Graham. 2003. "Longevity and Life Cycle Savings" *Scandinavian Journal of Economics* 105 (3): 319-38.
- [6] D. E. Bloom , D. Canning, and J. Sevilla. 2002a. *The Demographic Dividend: A New Perspective on the Economic Consequences of Population Change*, Santa Monica, Calif .: RAND, MR-1274.
- [7] D. E. Bloom, D. Canning, and J. Sevilla. 2002b. "Technological Diffusion, Conditional Convergence, and Economic Growth." Working Paper no. 8713. National Bureau of Economic Research, Cambridge, MA.
- [8] D. E. Bloom, D. Canning, and J. Sevilla. 2004. "The Effect of Health on Economic Growth. A Production Function Approach" *World Development* 32 (1): 1-13.
- [9] World Health Organization (WHO). *Stop TB annual report 2000*. Geneva, World Health Organization, 2001c.
- [10] World Tourism Organization (UNWTO). *WTO Committee on Sanitary and Phytosanitary Measures G / SPS / GEN / 204*, September 2000.
- [11] World Tourism Organization. *Compendium of tourism statistics*, 2001. http://www.world-tourism.org/frameset/frame_statistics.html
- [12] SCHULTZ TP (1961) "investment in human capital," *American Economic Review*, vol.51, p. 1-17.
- [13] Preston S. 1975. "The Changing Relationship Between Mortality and the Level of Economic development." *Population Studies* 29 (2): 231-48.
- [14] Wagstaff, A., and E. van Doorslaer. 2003. "Catastrophe and impoverishment in Paying for Health Care: with Applications to Vietnam 1993-1998." *Health Economics* 12: 921-34.
- [15] Weil, David N., "Accounting for the Effect of Health on Economic Growth," NBER Working Paper 11455, June 2005.
- [16] RG Wilkinson and Pickett, K., "Income inequality and population health: A review and explanation of the evidence", *Social Science and Medicine*, Vol. 62, 2006, p. 1768-1784

دراسة تجريبية عن فاعلية العلاقة بين الفقر والصحة والتطور في دولة ساوث شور البحر المتوسط

مجدي مقدم

جامعة سوسة - كلية العلوم الاقتصادية والإدارية - سوسة
mejdimm@yahoo.fr

الملخص:

تهدف هذه الورقة إلى دراسة من التفاعلات التجريبية بين الصحة والنمو الاقتصادي للحد من الفقر. ولتحقيق هذا السؤال، وضع نموذج للمعادلات المترابطة للنمو الاقتصادي الداخلي ولتحديد نوعية الفقر. وباستخدام البيانات المأخوذة من عينة من خمسة بلدان على الشاطئ الجنوبي للبحر الأبيض المتوسط خلال الفترة 1992-2014، توفر النتائج دليلاً على وجود علاقة إيجابية بين الصحة والنمو الاقتصادي من جهة، وإقامة علاقة إيجابية بين تحسين الصحة والحد من الفقر من جهة أخرى. وهكذا، فإن التأثير الكلي لمتوسط العمر المتوقع على الفقر يساوي - 0,705، مجموع التأثير المباشر وغير المباشر. نحن نحسن متوسط العمر المتوقع بنسبة 10% مما يؤدي إلى انخفاض معدلات الفقر - 7,05%.

وعلاوة على ذلك، فإن المعادلة (1) تبين أن زيادة المؤشر الذي يقيس عدم المساواة في الدخل تؤدي إلى زيادة في الفقر بمبلغ يساوي 0,82. وبالمثل، تظهر المعادلة (2) أن الزيادة في عدم المساواة في الوحدة قد تؤدي إلى انخفاض نمو الناتج المحلي الإجمالي - 1,08 مما يعني أنه حتى تأثير عدم المساواة في الدخل يقتصر أيضاً على تأثيره المباشر على الفقر، ولكنه يشمل أيضاً التأثير غير المباشر المرتبط بتطور الناتج المحلي الإجمالي. ونلاحظ الأثر الكلي لعدم المساواة في الدخل على الحد من الفقر. وفقاً للحساب أي زيادة في مؤشر عدم المساواة في الدخل 10% يؤدي إلى معدل زيادة في الفقر بنسبة 9,7%. ونلاحظ أيضاً أن تحسين الصحة هو الأداة التي لا غنى عنها للحد من الفقر.

الكلمات المفتاحية: النمو الاقتصادي، الصحة، الفقر، متوسط العمر المتوقع، عدم المساواة في الدخل، المعادلات المترابطة، بيانات اللوحة.