# Chapter 15
# The Determinants of Health Expenditures in Tunisia:
## An ARDL Bounds Testing Approach

**Sami Chaabouni**
*University of Sfax, Tunisia*

**Chokri Abednnadher**
*University of Sfax, Tunisia*

## ABSTRACT

*This article examines the determinants of health expenditures in Tunisia during the period 1961-2008, using the Autoregressive Distributed Lag (ARDL) approach by Pesaran et al. (2001). The results of the bounds test show that there is a stable long-run relationship between per capita health expenditure, GDP, population ageing, medical density and environmental quality. In fact, on the one hand there are the short-run and long-run results which reveal that health care is a necessity, not a luxury good. On the other hand, results of the causality test show that there is a bidirectional causal flow from health expenditures to income, both in the short and in the long run.*

## 1. INTRODUCTION

Since the 1960s, the increase of health expenditure has caused much concern all over the world. A number of studies have attempted to explain the rise in health expenditures and suggested what variables can be influenced to reduce the costs. All of these studies have considered the approach of the demand function to specify their models. Specifically, health care expenditures are hypothesized to be a function of real per capita income and other non income variables.

The non income factors have been identified in literature. So, what may affect the increase of health expenditures are the following:

- The demographic growth: care consumption and age are clearly linked. Therefore, indicators such as the proportion of the young (e.g., under 15 years old) and old people (e.g., above 65 or 75 years old) over the active or total population have been traditionally flagged as important factors in explaining variations of health care expenditure. However, little evidence exists about the significant effect of these variables (Grossman, 1972; Leu, 1986; Hitiris and Posnett, 1992; Di Matteo, 1998; Felder et al, 2000).

- The technological progress: since the works of Manning et al. (1987) and Newhouse (1992), the rapid technological progress has been seen as a factor of supply and demand who explains the growth of health care expenditure. However, due to the difficulty of finding an appropriate proxy for the changes in medical care technology, very few studies have attempted to study the relationship between the technological progress and health care expenditure. A number of proxies have been considered in literature, such as the surgical procedures and the number of specific medical equipment (Baker and Wheeler, 2000; Weil, 1995), the R&D spending specific to health care (Okunade and Murthy, 2002), life expectancy and infant mortality (Dregen and Reimers, 2005). Some other papers have investigated the effect of the technical changes by adding a time index or time-specific intercepts in the regression specification (Gerdtham and Lothgren, 2000; Di Matteo, 2004).

- The role of the real prices in determining the demand for health care is essential (Grossman, 1972). The various studies on the determinants of health care service noted that "a change in the volume of health expenditure is not sufficient to explain the evolution of the share of expenditure in the GDP" (Bac et Cornilleau, 2002). The increase in this price of heath expenditures may result in raising either the quantities of the consumed medical care or the prices of the health sector. The importance of any factor differs from one country to another. However, there is a little empirical consensus on the effect of the real prices on the health care expenditure. This consensus may be explained by the increasing prices of health services compared to other prices since wages in low productivity sectors must keep up with those in high productivity ones (Hartwig, 2008; Okunade et al., 2004),report a positive and statistically significant effect, while (Baumol,1967,Gerdtham et al., 1992; Murthy and Ukpolo, 1994) report an insignificant effect. Hartwig (2008, p.6) asserts that "…we have to recognize that medical care price indices can not probably be relied on as deflators or explanatory variables." In fact, since the studies argue that given the paucity of data on price, the diverse national schemes of price regulation and the problems in measuring the quality of health care in obtaining this medical price index, we decided not to use this variable in our empirical analysis.

- The medical density, which is defined by physicians as per thousand population and used to account for the supply of healthcare, can be considered a cause of the increase in the health expenditures (Delattre and Dormont, 2005; Murthy and Okunade, 2009). This led to the hypothesis of the induced demand which reflects the excess supply of services due to an increase in demand initiated by patients. Theoretically, induced demand is generated by the monopoly of the medical knowledge of doctors associated with the low sensitivity of patients to prices. The excess supply of care can then contribute to higher health costs depending on different modes of organization of health care systems.

- Institutional factors: the rise of health expenditure could come from taking the institutional factors into consideration. Two approaches are used. The first distinguishes the effects of instructions of remuneration. The second distinguishes the effects of the type of national health system (e.g.,

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