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The relationship between life expectancy at birth and health expenditures estimated by a cross-country and time-series analysis

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Abstract

In the last years, most countries experienced improved health outcomes as longevity increased steadily and infant mortality rate decreased, along with a growth of the health expenditures. The paper aims to analyze the relationship between the dynamics of the inputs and the outputs of health care systems. The input of the health care system is expressed by health care expenditures per capita (current US$) and the output of the health care systems is expressed by life expectancy at birth (years). The data are collected for 175 world countries, grouped according to the geographic position and income level, over 16 years (1995-2010). We apply a panel data analysis to estimate life expectancy by a function of health expenditures. The obtained results show a significant relationship between health expenditures and life expectancy. Country effects are significant and show the existence of important differences among the countries.

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Keywords: health system; income; geographic region; panel data; country-effects.

1. Introduction

The health of the population is under the impact of both the type of health systems and of their resources. The relationship between resources and outcomes is important for assessing if a country has a performing health system. A country has a health system with a better performance than another country, if, for the same level of resources, it generates better health outcomes, or if it generates the same outcomes but with fewer resources (Elola et al., 1995). Health systems are financed either through taxes, in the case of healthcare

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services owned by the state (national health services), or through income-related social contributions (social security systems) (Elola et al., 1995; Paris et al., 2010). In countries with high income per capita, the contributions to social security are important and sustain in a high extent the financing of the health system.

This study aims to analyze the relationship between the dynamics of the inputs and the outputs of health care systems. With the purpose of identifying the influence of health expenditures on life expectancy, we apply panel data analysis on a sample of countries grouped according to the geographic region and the income level per capita. To estimate the relationship between the two variables, we chose a fixed-effects model on country-level data covering the period 1995-2010 for different groups of countries.

The paper begins by a general reference to previous studies on the relationship between health outcomes and health resources. Then, it lays out the variables and the sample of countries, as well as the fixed effects regression approach. Finally, the main empirical results are presented and the final conclusions are drawn.

2. Literature review

The resources of health systems are measured by several indicators such as health expenditures (total expenditures on health per capita, health expenditure as % of GDP, % of public expenditure in total health expenditure), number of physicians, number of hospital beds, number of computed tomography scanners (Or, 2000; Ramesh and Mirmirani, 2007, Baltagi and Moscone, 2010). The indicator considered in this study for measuring the health input is total health expenditures per capita.

The output of the health systems is expressed either by longevity indicators such as life expectancy (life expectancy at birth, life expectancy at 65 years, healthy life expectancy) for total population and/or by gender, or by mortality indicators (mortality rate, infant mortality rate, potential years of life lost). These indicators are considered good proxies for measuring the health status of a population (Show et al, 2002; Cutler et al., 2006; Or, 2000; Poças and Soukiazis, 2010). The greater the life expectancy in one country, the healthier its population is (Jen et al., 2010). In the paper, life expectancy is considered for assessing the health status.

Previous studies that investigated the relationship between health resources and health outcomes are diverse in what concerns the analysed indicators, the model approach, and the countries studied. A review of the literature in this field was done by Nixon and Ulmann (2006). The majority of these studies analyzed panel data for developed countries, such as the US (Lichternberg, 2000), Canada (Crémieux et al., 2005) or the OECD countries (Hitiris and Posnet, 1992; Show et al., 2005), though some recent papers are focused on developing and less developed countries (Bayati et al., 2013). It has been found that health expenditures have a significant positive impact on life expectancy and a significant negative impact on mortality rate.

3. Data and method

3.1. Data

In this paper, we study the relationship between health expenditures and health outcomes. One of the indicators used to summarize the health expenditures is the total health expenditure. The total health expenditure is the sum of general government expenditure on health and private expenditure on health in a given year (The World Bank Data Indicators, 2013). In this analysis, we considered the health care expenditures per capita (current US$) as the explanatory variable.

In order to measure the outcomes of a health system we used life expectancy. Life expectancy at certain ages represents the mean number of years still to be lived by a person who has reached a certain exact age, if subjected throughout the rest of his or her life to the current mortality conditions (age-specific probabilities of dying) (Chiang, 1984). We analysed life expectancy at birth (years) as the dependent variable.