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EconomiA 17 (2016) 210–220
ECONOMIA
www.elsevier.com/locate/econ

The health influence on returns to education in Brazil: A nonlinear approach

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Received 17 December 2014; received in revised form 18 May 2016; accepted 27 June 2016
Available online 14 July 2016

Abstract

This paper investigates the returns to education in terms of individuals' health in Brazil. We use the Heckman procedure (1979) and a nonlinear model that allows the consideration of the existence of increasing returns. The study employs microdata from *National Survey by Household Sample* for 2003 and 2008. The health status is measured by self-assessment of individuals. We determine that the rate of returns decreases until the fourth and fifth years of schooling, that is, until the completion of primary education when increasing returns start. The evidence also indicates that the rate of return to education is lower for individuals in poor health; for people with 15 or more years of schooling, the rate of return is 10–14.5% lower for those who are unhealthy.

JEL classification: I1; I2; J2

Keywords: Return to education; Health; Nonlinear model

Resumo

O artigo investiga o efeito do estado de saúde individual na taxa de retorno da educação. O método empregado consiste em um modelo não linear, que permite a existência de retornos crescentes, e no procedimento de Heckman (1979). O estado de saúde é mensurado pela autoavaliação dos indivíduos. Com base nos dados da PNAD de 2003 e 2008, é encontrado que a taxa de retorno da educação decresce até o quarto e quinto ano de escolaridade, isso é, o retorno se torna crescente apenas a partir da conclusão das séries iniciais do ensino fundamental. Os resultados também apontam que a taxa de retorno é inferior para indivíduos que não referiram uma boa saúde; para indivíduos com 15 ou mais anos de escolaridade, a taxa de retorno é de 10% a 14.5% menor para indivíduos não saudáveis.

Palavras-chave: Retorno da educação; Saúde; Modelo não linear

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Peer review under responsibility of National Association of Postgraduate Centers in Economics, ANPEC.

http://dx.doi.org/10.1016/j.econ.2016.06.002

1. Introduction

The literature reviewed shows that there is a close relationship between health status and socioeconomic variables, especially education and income. This relationship has been found in different countries and various measures of health have confirmed these findings. In explaining this relationship, Grossman (2000) argues that healthy people have advantage in obtaining additional years of schooling and knowledge quality. Hence, individuals in poor health miss more days of school and they learn less during the school year.

Some studies have shown empirical evidence of this relationship by addressing the effect of low birth weight on adult outcomes in twins (Black et al., 2007; Oreopoulos et al., 2008), individual shocks *in utero* (Almond, 2006; Almond et al., 2009) and early childhood nutrition problems (Maluccio et al., 2009; Khanam, 2014).

Other important aspect is that better health is associated with higher labor productivity and time available to work, which are essential factors in the labor market and, therefore, income. Healthier people tend to have higher labor productivity due to their greater physical energy and mental clearness, besides having a greater investment in human capital, the main driver of productivity (Bloom and Canning, 2000). Furthermore, Smith (1999) showed that poor health is associated with lower income and fewer accumulated assets because people with poor health have increased medical expenses and limitations on working, so healthier people can work for more hours in a week and more weeks in a year. Bloom and Canning (2000, p. 1209) conclude that "poor health is more than just a consequence of low income; it is also one of its fundamental causes".

The literature has several studies of the relationship between health status with education and income, however, estimates of return to education that include health status, like this one, are limited. Although higher education is commonly related with higher wages, the returns to education may differ for different groups. The literature usually breaks down the returns by gender (Psacharopoulos and Patrinos, 2004; Mendolicchio and Rhein, 2014; Daoud, 2005), race (Mwabu and Schultz, 1996) and location (Suliano and Siqueira, 2012). There are few studies that have investigated returns to education across health groups. It is well known that the average schooling, average hourly wage, labor productivity and availability for work differ between health and unhealthy individuals. Likewise, the rate of returns might also differ by health status, as found for individuals with disabilities and poor health (Lamichhane and Sawada, 2013; Lamichhane and Watanabe, 2015; Hollenbeck and Kimmel, 2001). In specific for developing countries, to our knowledge, there is no study that analyzes the difference of return to education in terms of individuals' health (good and poor health).

In this paper, we investigate whether the returns to education change in the context of poor health and the year of schooling for which the difference intensifies. Specifically, we examine the influences of health status on the rate of return to education. The remainder of this paper is organized as follows: Section 2 provides a brief summary of studies in relation the rate of return and nonlinearity regarding the schooling; Section 3 explains our empirical strategies and describes the data set from Brazil; in Section 4, the empirical findings are reported. Finally, Section 5 presents the paper's conclusions.

2. Nonlinearity in the education

In the literature on the schooling returns, Mincer (1974), in his seminal work, estimates the wage equation in which the logarithm of hourly earnings is explained by schooling years, experience and the square of experience. In this model, the estimated coefficient of schooling is interpreted as the return of an additional year of schooling. The pioneering work of Mincer has been repeated by several authors for different countries and periods (Psacharopoulos, 1994; Psacharopoulos and Patrinos, 2004; Rauch, 1993; Blackburn and Neumark, 1993; Moretti, 2004; Pons and Gonzalo, 2001). For Brazil we have several studies as Psacharopoulos (1987), Leal and Werlang (1991), Blom et al. (2001) and Araújo and Silveira Neto (2004). These studies, although important in the literature, did not consider the sample selection bias discussed by Heckman (1979).

Heckman (1979) investigated the bias that resulted from estimations using a non-randomly selected samples to analyze behavioral relationships. For example, when observations on wage are available only for those who are working, the wage offered by employers exceeds their personal reservation wage. A two-step process is used to correct the bias. The Heckman approach has been used in some Brazilian empirical analysis, including Kassouf (1994), Sachsida et al. (2004), Resende and Wyllie (2006) and Dias et al. (2013).