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Human capital and economic growth in Spain, 1850–2000☆

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ABSTRACT

We investigate human capital accumulation in Spain using income- and education-based alternative approaches. We, then, assess human capital impact on labor productivity growth and discuss the implications of its alternative measures for TFP growth. Trends in human capital are similar with either measure but the skill-premium approach fits better Spanish historical experience. As education is a high income elastic good, human capital growth computed with the education-based approach seems upward biased for the recent past. Human capital provided a positive albeit small contribution to labor productivity growth facilitating technological innovation.

1. Introduction

The role of human capital in the growth process has been extensively analyzed since Adam Smith and Alfred Marshall, and has interested both theoretical economists and economic historians. However, it was not until the mid-twentieth century that Becker (1964), Schultz (1961), and Mincer (1958) developed a complete theory of human capital, according to which the individual level of education and experience determines future labor income. The United Nations (1997) defines human capital as "productive wealth embodied in labor, skills and knowledge" while the OECD describes it as "the knowledge, skills, competencies and attributes embodied in individuals that facilitate the creation of personal, social and economic well-being" (OECD, 2001). This broad definition does not restrict human capital to education but encompasses all investments in humans which are made to improve their skills, including schooling and informal education provided by parents or other family members, on-the-job training and learning-by-doing (i.e., acquiring skills through work experience) or any other activities that improve the productive use of a person's skills.

The measurement of human capital is even more elusive than its definition. Many authors have employed formal education measures, such as enrolment rates or the level of educational attainment, while others resorted to indirect proxies including literacy and numeracy as a way to identifying human capital. However, none of these measures adequately defines human capital since they ignore informal education, vocational training, workers' experience, and on-the-job training. Further, these partial measures do not consider the economic value (benefit) of human capital, the potential differences in rates of return between different types of education, and the acquisition of human capital for individual consumption and not for production. The point is that a "sound" measure of human capital should be not only comprehensive but also consistent with theoretical underpinnings. How to measure human capital will be the first question to be addressed in this paper.

The second question we will consider, the contribution of human capital to economic growth, has attracted considerable attention from the literature. There is a degree of consensus among economists and economic historians about the important role of human capital in long run growth and its contribution to convergence and catching-up (Abramovitz, 1986). Schultz (1963) argued that a large share of economic growth comes from further additions to the initial stock of human capital and that human

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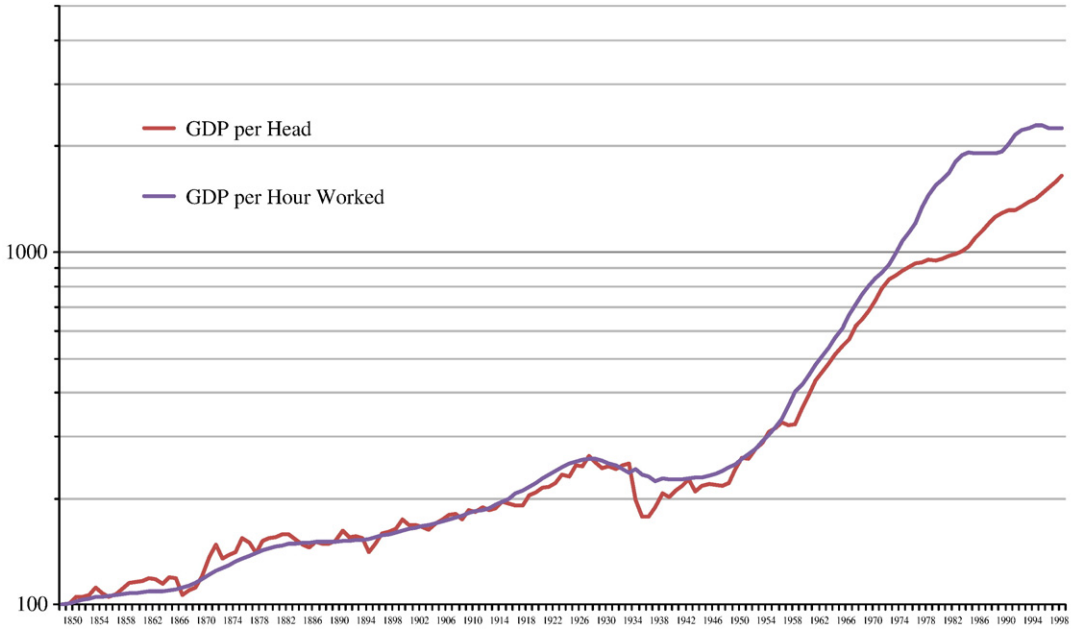

Fig. 1. Real GDP per head and per hour worked.
Source: Prados de la Escosura (2003, updated).

capital accumulation was largely responsible for the "residual" in early growth accounting exercises. Denison (1962) and Griliches and Jorgenson (1967) examined this hypothesis empirically and concluded that changes in the quality of the workforce did not account for all total factor productivity (TFP) increases. With the emergence of 'new growth theory' in the 1980s and 1990s and, in particular, with the important contribution by Lucas (1988), the relationship between human capital and growth became even more central for those interested in the causes of growth. Again, new empirical studies, in this case based on cross-country regressions, have served to qualify initial theoretical arguments. Benhabib and Spiegel (1994) and Krueger and Lindahl (2001) pointed out that it is the level of educational attainment rather than its increase that matters for growth. More recently, Cohen and Soto (2007) have argued, instead, that growth in schooling rates has a statistically significant influence (albeit a relatively modest one) on GDP growth rates. Among economic historians, Sandberg (1979) attributed the successful development of the Swedish economy during the nineteenth century to its comparatively higher literacy levels.[1] In a similar vein, several studies related successful and unsuccessful development stories during the nineteenth century to the presence or absence of certain education levels.[2]

The contribution of this article is twofold. On the one hand, we provide two alternative measures of human capital for Spain from 1850 to 2000: the first is based on the concept of education, and the second on Jorgenson's income-based concept of 'labor quality'. Then, we review the advantages and shortcomings of each measure and discuss whether they are compatible. As a contrast, we present new empirical evidence on human capital accumulation, and we use a growth accounting framework to explore its contribution to economic growth.[3] As a country whose people were poor and ignorant during the nineteenth century, but which had joined the club of rich countries by the late twentieth century, Spain's experience is particularly relevant for the debate. Over the past century and a half, Spain has experienced a sustained expansion of GDP per head at an average rate of 1.9% per year, and GDP per hour worked has increased by an annual average of 2.1% (Fig. 1). Although long-run trends in human capital are similar whichever of the two measures is used, we conclude that the direct, skill premium approach favored by Jorgenson fits better the historical experience of Spain as observed over shorter periods. Human capital provided a positive, albeit small, contribution to labor productivity growth and it could be suggested that human capital accumulation probably had a positive effect on GDP level facilitating technological innovation (Table 1).

[1] A more recent assessment of the Swedish case is provided by Ljungberg and Nilsson (2009).

[2] In sharp contrast, another stream of literature stresses the limited contribution of human capital to growth during the Industrial Revolution (see the review by Mitch (2004)). A revisionist view that emerged late in the 1990s claimed, on the basis of microeconomic evidence, that the industrial workforce was skilled despite its low levels of formal education (Rosés, 1998; Bessen, 2003; Boot, 1995). Industrial labor acquired skills in different ways (for example, children and young people got practical know how and experience working in the factories). However, these studies also showed that the level of human capital facilitated the adoption of new technologies, but its accumulation did not contribute significantly to increasing GDP growth rates.

[3] Thus, we will decompose growth rates into the contribution of production factors in terms of quantity and efficiency. This framework does not include a particular growth theory since it only provides a descriptive procedure and it is, therefore, compatible with the alternative specifications of different growth models (Barro, 1999; Collins and Bosworth, 1996). In this paper, we make a historical adaptation the approach of Domar (1961) and Griliches and Jorgenson (1967) to measure factor inputs in terms of quality.