

Contents lists available at [ScienceDirect](https://www.sciencedirect.com)

Economic Modelling

journal homepage: <https://www.journals.elsevier.com/economic-modelling>

Economic crisis and public education. A productivity analysis using a Hicks-Moorsteen index

Juan Aparicio^a, Laura López-Torres^b, Daniel Santín^{c,*}

^a Center of Operations Research, University Miguel Hernandez of Elche, Av.de la Universidad s/n, 03202 Elche, Spain

^b Department of Economics and Business, University of Alcalá, Plaza de la Victoria, 2, 28802 Alcalá de Henares, Spain

^c Department of Applied, Political and Public Economics, Complutense University of Madrid, Campus de Somosaguas, 28223 Madrid, Spain

ARTICLE INFO

Keywords:

Productivity
Hicks-moorsteen
Convergence
Public schools
Economic crisis
Education

JEL classification: C14

C43
C61
C67
D24
H12
H52
I21

ABSTRACT

The economic crisis forced politicians to make public finances sustainable. The education sector was one of the most adversely affected by control of public expenditure. This paper analyzes the drivers causing productivity changes of especially vulnerable public schools during the crisis. We use the Hicks-Moorsteen index, which is a seldom applied methodology that leads to feasible results under variable returns to scale. To illustrate the benefits of this index, we use a sample of 298 Catalan public primary schools between 2009 (when budgetary constraints started) and 2014. The results reveal that during the crisis schools improved their total factor productivity by raising academic achievement despite cutbacks in resources. We also found that there was a strong convergence pattern during the financial crisis, driven by the catch-up process of some schools. The findings have important policy implications, suggesting that a monitoring system should be set up for use by policy makers.

1. Introduction

In the wake of the global financial crisis, countries face the challenges of making public finances sustainable. Likewise, there is closer scrutiny of how public funding is spent in times of austerity (Bel et al., 2010). Publicly funded sectors are therefore under pressure to deliver more for less, and the education sector is no exception. In the specific case of Spain, the central government cut the education budget by more than 11% from 2010 to 2015 in order to reduce the high public deficit of public administrations. This cutback was implemented by applying a number of measures, such as increasing the student-teacher ratio, expanding the range of increases in university tuition fees, cutting teachers' salaries or suspending teacher replacements.¹ Educational spending in Spain as a percentage of the GDP dropped more than the national wealth from 5.03% of GDP in 2008 to 4.79% in 2011, reaching a minimum of 4.28% in 2014 (Martínez, 2011).

The main consequence of the crisis was that there were fewer available resources in the public education sector than in previous years.

Additionally, existing differences in per capita expenditure on education across the regions of Spain are much greater than can be explained by any reasonable index of cost per inhabitant. Under these conditions, the same level of this basic public service is unlikely to be provided throughout the country and equal opportunities in education cannot be guaranteed. Catalonia, where the investment in public education in terms of GDP remained below the Spanish average, was the region that most felt the consequences of spending cuts. Comparing public expenditure on education in 2007 and 2013, Pérez et al. (2015) concluded that the regions of Extremadura and Andalusia allocated the highest percentage of GDP to education (6.5% and 5.7%, respectively, in 2013), whereas the lowest percentage expenditure was to be found in Catalonia and Madrid (2.6% and 3.4%, respectively, in 2013). Catalonia and Madrid are the top-ranking regions in terms of GDP in Spain.

Additionally, the crisis hit the poorest neighborhoods especially hard. Consequently, the percentage of students from families with economic difficulties soared from 35% in 2009 to 70% in 2014 in some schools. Another interesting fact is that, because of the cuts, some schools lost up

* Corresponding author.

E-mail address: dsantin@ccee.ucm.es (D. Santín).

¹ Spanish Organic Law on the Improvement of Educational Quality (Ley Orgánica 8/2013, de 9 de diciembre, para la mejora de la calidad educativa (LOMCE))

<https://doi.org/10.1016/j.econmod.2017.11.017>

Received 9 July 2017; Received in revised form 5 November 2017; Accepted 17 November 2017

Available online xxxx

0264-9993/© 2017 Elsevier B.V. All rights reserved.

to three teachers and one-third of the hours of the Educational Psychology Team. This team, made up of psychologists, educators and social workers, helps students with difficulties (i.e., disadvantaged schools had, on average, 8.5 teachers per 100 students in 2014, whereas the rest of schools had 10). There have also been substantial cuts in schools' operational expenditures and the budget for school meals or textbook grants (e.g., €35.32/student at disadvantaged schools compared to €46.12/student at other schools in 2014). On these grounds, our analysis focuses on schools classified as 'especially vulnerable' by the Catalan Regional Government, as they were the most likely to bear the brunt of the educational cuts introduced as a result of the financial crisis.

At this juncture, any action aimed at assessing efficiency and productivity changes in the public sector is an economic policy priority. This analysis is important in both the private and public sector since it can highlight strengths and weaknesses in current practices, revealing potential improvements. Ultimately, it may lead to a better use of the resources spent on public services provision (Asmild et al., 2012). Furthermore, assessing the drivers of productivity changes is also important for educational policy. By identifying such drivers, schools can be monitored over time in order to pinpoint best and worst practices and provide policy makers with valuable information for decision making. Consequently, the main goal of this paper is to estimate productivity changes in especially vulnerable public schools in Catalonia during the period of the global financial crisis (from 2009/10 to 2013/14) and determine their main drivers. Our second aim is, following Degl'Innocenti et al. (2017), to analyze the convergence patterns in the productivity change indices of the above public institutions across the analyzed period.

Several different empirical approaches can be applied to achieve our main aim (see Johnes, 2015 for a review of the methods for measuring efficiency and productivity). In this study, we use a special and seldom used index, known as the Hicks-Moorsteen total factor productivity change index (HMTFPC) proposed by Bjurek (1996). This index has clear advantages over the more often used Malmquist index. Defined as a ratio of an output quantity index to an input quantity index, the HMTFPC index is an ideal tool for measuring productivity changes and monitoring DMUs in terms of resource allocation over time (O'Donnell, 2012a). Additionally, it can be easily decomposed into meaningful measures of productivity change components: technological change and efficiency change. To address the second objective, we use the β -convergence and σ -convergence tests developed by Barro and Sala-i-Martin (1991, 1992, 2004).

In summary, we firstly seek to discover the drivers of total factor productivity change (TFPC) in public schools as a result of the financial crisis, as well as identifying best practices and resource mismanagement. Secondly, we try to highlight the relative advantages of the HMTFPC index for developing a monitoring system to be used by policy makers for decision making on resource allocation. As discussed above, the HMTFPC has very good theoretical properties, but has seldom been used in the educational context. Finally, we aim to expand the evidence in the literature by analyzing the link between productivity growth and convergence during the financial crisis. This will be of great interest to policy makers who need to assess the stability and competitiveness of the education system and promptly identify corrective interventions.

To do this, we applied the HMTFPC index on a sample of 298 especially vulnerable public schools in Catalonia using a rich balanced data set covering five academic years, from 2009/10 to 2013/14.² This is a suitable time period for analyzing the antecedents and consequences of the economic crisis on productivity changes.

This study contributes to the enrichment of the existing literature on Education Economics in the following terms: First, it allows progressing in the analysis of the productivity changes in the Spanish public

educational system at institutional level, adding new empirical evidence to the scarce research to date. Second, the analysis of productivity changes is done by using a HMTFPC index, that overcomes the limitations of other indexes such as the Malmquist Index, and that is scarcely applied in the education literature. Third, our study significantly contributes to the analysis of the convergence patterns of productivity change in educational environment.

The paper is structured as follows. Section 2 reviews the literature on efficiency and productivity analysis in education. Section 3 details the methodological approach used in this paper. In Section 4, we describe the data and variables used in the study. Section 5 summarizes the empirical results. Finally, Section 6 outlines our conclusions.

2. Literature review on efficiency and productivity analysis in education

This section reviews the recent literature on efficiency and productivity analysis in education. It provides the theoretical background for examining TFPC in public schools using the Hicks-Moorsteen index. The analysis of the efficiency of educational institutions has been explored at length over the last few decades as a result of growing interest in improving the performance of public sector and non-profit institutions (Liu et al., 2013). In the wake of pioneering work by Bessent and Bessent (1980), Charnes et al. (1978, 1981) and Bessent et al. (1982), empirical studies on efficiency and productivity in education have grown in importance. This body of literature has led to findings that have afforded more knowledge and a better understanding of the educational factors that influence students' outcomes. It also provides useful information for public administration decision makers.

Although we identified several empirical approaches and methods for measuring efficiency and productivity, frontier methods are the gold standard approach used in two forms: non-parametric [data envelopment analysis (DEA), free disposal hull (FDH), order- m frontiers] and parametric [stochastic frontier analysis (SFA)] methods.³ Frontier methods faithfully illustrate the essential characteristics of measuring efficiency and are valuable for monitoring and benchmarking decision-making units (DMUs). Most studies analyzing education adopt non-parametric frontier techniques such as DEA. This is because this approach is capable of analyzing the efficiency of multiple-input–multiple-output processes (Worthington, 2001; Liu et al., 2013) and does not require a specific functional form for the production function. This is a big advantage when the technology of the production function is not obvious, as in the case of education (Johnes, 2006).

Since DEA first emerged, its applications to the field of education have grown continuously and rapidly (Emrouznejad and Yang, 2017). A myriad of papers in the literature have applied several DEA models to assess efficiency in the education sector at all levels of education and with different units of analysis (see De Witte and López-Torres, 2017 for a detailed literature review). Johnes and Johnes (1995), Grosskopf et al. (1999), Portela and Thanassoulis (2001), Abbott and Doucouliagos (2003), Thieme et al. (2012), Bogetoft et al. (2015) are all empirical papers exploring efficiency in the education sector using a one-stage DEA model.

Furthermore, Giménez and Martínez (2006) use DEA to measure cost-efficiency at university level, finding evidence of efficiency gaps across countries. Additionally, Portela and Camanho (2010) and Portela et al. (2013) employ DEA to compute student and school value added. Several papers in the literature have applied second-stage DEA models (e.g., Ray, 1991; Afonso and Aubyn, 2006; Muñoz et al., 2006; Cordero-Ferrera et al., 2010; Mingou and Vierstraete, 2013; Masci et al., 2017). Another recent research strand applies more robust DEA models such as the conditional model (Haelermans and Ruggiero, 2013),

² For simplicity's sake, we refer to the academic year using the first natural year (i.e., 2009 for 2009/10).

³ A review of the strengths and weaknesses of different frontier analysis techniques can be found in Fried et al. (2008).

Download English Version:

<https://daneshyari.com/en/article/7347104>

Download Persian Version:

<https://daneshyari.com/article/7347104>

[Daneshyari.com](https://daneshyari.com)