



The efficiency of public education spending in Latin America: A comparison to high-income countries



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ABSTRACT

This study analyzes the efficiency of public education spending and the role of possible conditioning factors in upper-middle income Latin American countries compared to high-income economies over 1970–2010. It applies a two-stage approach first obtaining country-efficiency scores through a Data Envelopment Analysis (DEA) and then identifying their possible determinants by means of panel bootstrapped truncated regressions. Results show a minor role of inefficiency since 1990 and different efficiency profiles depending on the country's education outlays. Besides, globalization and democracy show up as important conditions affecting the efficiency path of the Latin American sub-sample.

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1. Introduction

Over the last years, concerns about public sector efficiency have increasingly become a focus of interest for policymakers. More efficient public interventions are deemed to alleviate budget constraints by reaching the same results with fewer resources or improving the outcomes from current investments. This principle would hold, even for sensitive policy objectives and for countries at different development levels. Hence, the lack of efficiency in public education spending has been frequently put forward to explain the low education achievements of Latin American countries (ECLAC, 2015; IADB, 2011; IMF, 2014). Conversely, the fact that these countries have been also characterized by relatively low public education outlays, seem to have gradually received far less attention. Still, lack of resources may jeopardize the ability of mere efficiency improvements to lead to better outcomes.

The goal of this paper is to track the presence of the alleged resource misuse in Latin American countries by estimating education spending efficiency and the conditions shaping

efficiency in the region from a long-term perspective. It considers a sample where 11 upper-middle income Latin American economies are compared to 24 high-income countries (from now on, LACs and HICs, respectively) in the period 1970–2010.

The study applies a Data Envelopment Analysis (DEA) to determine an efficiency score for each country. In a second stage, *bootstrapped* truncated panel regressions models are estimated to account for possible determinants of the efficiency path, with a specific attention on LACs. The primary focus is on the role played by income per capita, economic globalization and democracy.

Though still far from the average 6% of GDP invested in education by HICs, the figure in LACs went up from 3.1% in 1970 to 4.5% in 2010 (World Bank, 2015). However, these spending levels are rather low compared to other upper-middle income regions. Per-pupil spending in primary and secondary education –that account for more than 80% of the total – has been, respectively, 12% and 14% of GDP per capita in LACs vis-à-vis 15% and 18% in countries from other regions with similar GDP per capita levels. This heterogeneity in expenditures is not exclusive of upper-middle income countries; for instance, among HICs, the average education spending ranges from 5% (Switzerland) to 7.13% of GDP (Denmark). Given that spending profiles do not seem to strictly follow from GDP levels, this paper aims at understanding the relationship between efficiency and changes in per capita income levels.

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Along with income, two significant changes might have affected efficiency during the period. The first one is the acceleration of economic globalization. The shock was particularly intense for LACs, as international exposure had been historically low during the “inward-looking development stage” (1950–1973). Since then, a drastic trade and financial liberalization was combined with hard budget constraints seeking to curb inflation and gain international competitiveness.¹ The second essential change is the democracy recovery. While political participation and competitiveness were already consolidated in HICs, after the mid-1980s several LACs could overcome *de facto* regimes and restore democratic institutions. Regarding the amount of public education spending, the available literature finds that economic openness has had a positive impact on HICs’ (Cameron, 1978; Garrett, 2001; Rodrik, 1998), but not on developing economies (Kaufman and Segura-Ubierno, 2001; Wibbels, 2006). By contrast, democracy and social outcomes have appeared more clearly linked with increasing education expenditures at LACs’ recently recovered democratic systems than at HICs’ long lasting democratic contexts (Adserá and Boix, 2002; Brown and Hunter, 1999; Kaufman and Segura-Ubierno, 2001). Adding to this background, this study discusses whether these factors have also exerted a differing influence in terms of spending efficiency in LACs and HICs.

The data and estimation methods used in the present analysis are different from previous cross-country DEAs studies. A large proportion of the existing literature measures education efficiency for recent periods based on the results of the Programme for International Student Assessment tests (PISA) and, with few exceptions, it mainly covers high income countries (Afonso and St. Aubyn, 2005, 2006; Mandl et al., 2008; Sutherland et al., 2007, 2009; Verhoeven et al., 2007; Thieme et al., 2012). By contrast, and due to scarcity of data on PISA scores, cross-country studies available for developing economies have generally measured efficiency in terms of enrollment rates and adult illiteracy (Afonso et al., 2010; Grigoli, 2014; Gupta and Verhoeven, 2001; Hauner and Kyobe, 2010; Herrera and Pang, 2005; Jayasuriya and Woodon, 2005). Within this group, the particular case of Latin American countries has been barely considered (Machado, 2006; Afonso et al., 2013; Salazar Cuellar, 2014). On the other hand, the determinants of efficiency variability have generally been explored by means of cross-section Tobit models. The use of panel data and truncated regression techniques have been less frequent (Grigoli, 2014; Hauner and Kyobe, 2010; Wolszczak and Parteka, 2011).

This paper contributes to the previous literature in various ways. First, it significantly enlarges the time span of previous analysis by using education attainment to estimate efficiency. Second, the country-sample combines the LACs’ more advanced economies and the world’s richest ones. This setting attempts to better assess LACs’ current policy challenges, which tend to remain hidden when regional, developing or world-wide samples are analysed. Finally, it applies panel *bootstrapped* truncated regressions, as suggested by Simar and Wilson (2007), to address the differing impact of efficiency determinants between country-groups.

The paper is organized as follows. Section 2 provides an overview of the data sources used to compute efficiency and its determinants. In Section 3, the methodological approach and empirical strategy are explained. Results are presented in Section 4, while Section 5 analyzes their robustness. Section 6 discusses the main findings and Section 7 concludes.

2. Data and sources

2.1. DEA scores

The analysis builds on a panel comprised by 11 Latin American upper-middle income economies and 24 high-income countries, as classified by the World Bank (Table A1 in the Appendix). The data cover the period 1970–2010.

Following the Data Envelope Analysis (DEA), given a set of comparable individuals, efficiency measures the degree to which their use of some inputs to produce certain outputs matches the optimal one. In the present paper, the output indicators are “average schooling years” and “population with secondary level as highest attainment” (not necessarily complete) for those aged more than 15 years old. The latter is expressed in absolute terms, to reflect the size of each country. This output-mix is deemed to capture the stock of qualifications or education capital produced by each domestic education system, providing an idea about the effectiveness of the access to formal education. Its advantage against the more common “enrollment rate” is that the latter includes those that drop-out of school prematurely and is affected by the number of repeat students.

The input is per capita public education spending. As output variables are not attached to any particular education level, the input measures the bulk of public resources invested by a country to sustain its education system from pre-school to university and tertiary educational levels.

Data on school attainments come from the Barro and Lee database, version 2.0 (2013). It compiles information on 146 countries from 1950 to 2010, at 5-year intervals. This restricts the efficiency estimations for each country to 9 time-spans between 1970 and 2010.

Public education expenditure data have been obtained from several sources, as they were not directly available from a single database or, in some cases, did not cover the General Government—the most suitable category to account for the real fiscal effort addressed to education.² Information has been compiled from ECLAC, IMF, OECD, stats, UNESCO and the World Bank, together with statistical information from each particular country. Azar and Fleitas (2012) contain detailed references. Data are expressed in constant purchasing power parity adjusted dollars (PPPs) and in per capita terms, based on the series of GDP and population of the Penn World Tables (PWT, 8.0) (Feenstra et al., 2013). Table A.3 contains the descriptive statistics for the output and input variables.

It must be noted that while the input refers to public spending, the outputs reflect the education attainment of the whole population, not just of those who have participated in the public subsystem. Since the available data do not allow distinguishing between the public and private education sector output, the estimates will not exactly capture “public” spending efficiency. However, this bias is partially neutralized by the weight of the public subsystem within the country sample. On average, during the period, public enrollment in LACs has been 83%, 78% and 70% of total at the primary, secondary and tertiary levels, respectively. The equivalent percentages in HICs have been 82%, 81% and 80%. Within both country groups, the diversity of public enrollment shares has been higher for tertiary education, where in addition, the presence of the public sector has tended to decrease over time (Table A2). Yet, tertiary education represents the lowest share of education spending (an average of 20% of the total in both country-groups). Therefore, the evolution of the output indicators that are

¹ These policies were part of the “Washington Consensus”, a term applied to the set of structural reforms for the region, promoted by the International Monetary Fund and the World Bank.

² General Government consists of central, state and local governments and social security funds.

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