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The effect of districts' social development on student performance☆

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ABSTRACT

This paper explores the relationship between student performance and social development in the districts where schools are located. The empirical research, which focuses on Costa Rica, combines geolocalized data of schools from PISA 2012 with a composite index of social development that has four components: health, economy, education and electoral participation. Our results show that social development has positive, but diminishing effects, on test scores and accounts for 11.6%, 13.1% and 14.8%, respectively, of the total variance in math, reading and science. The economic and education dimensions of social development positively correlate with academic achievement. In the case of electoral participation, the estimations show a significant effect only in math. We find no significant effect of health. Educational policies should give particular emphasis to the lowest-ranked districts where the expected returns from policies that increase social development are the highest.

1. Introduction

There is a growing interest in explaining for the determinants in educational achievement as an important factor behind economic development (Hanushek & Woessmann, 2015). The underperformance of Latin American education systems and the intensity of the skills gap in this region compared to other emerging regions (Hanushek & Woessmann, 2012; Melguizo & Perea, 2016) motivated us to focus on Latin America and to explore the relationship between educational achievement and the socio-economic characteristics of the school districts. On this continent, there are large student performance gaps within the same town or city and even between schools located very close together, a reflection of the high-income inequalities in Latin American urban areas.

We focus on the interaction between educational achievement and social development at district level. This relationship has been relatively unexplored because of data availability problems. We handle this issue in our research by focusing on Costa Rica, which allows us to work with highly disaggregated data. Our empirical analysis requires homogeneous information with a high degree of geographical disaggregation for a large set of variables that include educational and social data. Costa Rica is one of the countries in the region with more accurate statistics, both with regards to the variety of the information collected and in the methodological quality of its elaboration. In addition, this country brings together a set of characteristics that are very relevant for this study. Costa Rica is ranked as a country of high human development, according to United Nations. With a value of 0.776 in the 2015 Human Development Index, it is ranked 66th in the world and 5th in Latin America. Its life expectancy is the highest of the region (79.6 years) and it has one of the oldest and most stable democracies on the continent.

The hypothesis to be tested is whether social development—defined in a multidimensional perspective encompassing health, economy, education and electoral participation—has a significant effect on academic achievement. Our methodological approach provides several contributions to previous research: 1) the combination of the OECD PISA 2012 dataset and a district-level Social Development Index (SDI); 2) the use of educational data with three-level hierarchical models (students, schools and districts), which allows us to deal with selection bias and unobserved heterogeneity; 3) the analysis of non-linearities; and 4) the use of the Shapley-Shorrocks decomposition of the variance to estimate the relative contribution of the SDI to the variance of the test scores. The empirical work suggests that social development has a positive, but diminishing, effect on test scores and explains a significant part of their variance. This result is robust to the different disciplines (math, reading and science).

The rest of the paper is organized as follows. Section 2 gives an overview of the literature on the determinants of educational

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achievement, highlighting in different dimensions of social development. In Section 3, the data and empirical methodology employed in the paper are presented. Section 4 shows the results of the estimation of the education production function. Section 5 contains the Shapley-Shorrocks analysis. Section 6 provides a summary and conclusions.

2. Literature background

Research has shown that not only school and family, but also the "wider environment" in which students interact affect their outcomes. Indeed, as Rasbash, Leckie, Pillinger, and Jenkins (2010, p. 657) state that, "children are raised in complex social environments that involve multiple layers of influence", following Bronfenbrenner (1977). As well as the more conventional family and school factors, local area influences may also be worth considering. One strand of multidisciplinary literature deals with the effects that living in a certain area may have on a series of outcomes related to physical and mental health, future earnings, behavioral problems in youngsters, or educational achievement. Different types of causal mechanisms, such as community networks or role models, have been put forward by researchers (Burdick-Will et al., 2011; Durlauf, 2004; Galster, 2012; Sampson, Morenoff, & Gannon-Rowley, 2002; Van Ham & Manley, 2012; Vigdor & Ludwig, 2010). In this section, the literature linking student success and social development is reviewed. We focus on four dimensions: health, economy, education and electoral participation.

2.1. Health

A local environment with better health conditions, such as birth weight, malnutrition or access to safe water, directly or indirectly influences students' cognitive abilities. A healthier environment positively influences children's ability to learn and, hence, acquire skills (Case, Fertig, & Paxson, 2005; Currie & Goodman, 2010; Miguel & Kremer, 2004; Ozier, 2014). For instance, sight or hearing difficulties, which hinder school performance, are more likely to affect children in lower-income families (Rothstein, 2010). Poor health indicators in a community may signal poor socioeconomic conditions, which do not provide children with a supportive environment for academic achievement.

Nevertheless, some empirical studies in developing countries have questioned this relationship (Aguilera & Quintana, 2011; Evans & Popova, 2015) or conclude that health programs can be ineffective (Conn, 2014; McEwan, 2015).

2.2. Economy

Studies show that children who live in extreme poverty or who lack basic needs like food, clothing, shelter or infrastructure—such as electricity or access to the Internet— are more likely to perform poorly at school and are also very likely to drop out. Dual factors of socialization and social status have an influence on the achievement of students who attend school (Harris, 2006; Jensen, 2009).

In the US context, the evidence from the Moving to Opportunity experiment of the 1990 s is worth to be considered.[1] Recent research shows the importance of neighborhood economic conditions for children's upward economic and social mobility, as moving to lower-poverty areas at a very young age has significant benefits (Chetty, Hendren, & Katz, 2016). In a different context for Milwaukee (Wisconsin), Carlson and Cowen (2015) study the relationship between the socioeconomic characteristics of the neighborhood and student outcomes. They find evidence of the importance of neighborhoods as a determinant of test scores, albeit less than schools. Owens (2010) also concludes that neighborhoods have a significant influence on educational attainment even when school characteristics are taken into consideration. In addition, the disadvantages of students coming from neighborhoods with a low level of socioeconomic development are not eliminated by changing the school they attend.

In the case of Latin American, Vivas Pacheco, Correa Fonnegra, and Domínguez Moreno (2011) study the relationship between educational achievement and the socioeconomic and family context of Colombian students. They conclude that there is a tight nexus between the quality of the local context and the educational outcomes they may achieve. In fact, of the different factors considered, the neighborhood has the biggest impact on educational achievement. In other words, students in disadvantaged neighborhoods are worse off than others living in better areas. Del Valle and Fernández (2014) study this relationship, in the case of Costa Rica, using the socioeconomic level of the community. They conclude that there are correlations between a district's level of development and student outcomes. Giménez and Castro (2017) emphasize the importance of reaching a minimum level of public infrastructure to guarantee that basic household needs like access to electricity and telecommunications are fully covered. These authors argue that the quality of these types of services are strongly related to student achievement in Costa Rica. Jiménez, Matus, and Martínez (2014) find that information and communication technologies (ICTs) have a positive effect on economic growth, innovation and higher-quality education in Mexico. In addition, the importance of ICTs as a potential contributor to development is explicitly recognized in the *Sustainable Development Goals*.

2.3. Educational development

Disadvantaged schools are more likely to suffer from shortages or inadequacy of educational materials and physical infrastructure—such as school grounds and buildings, heating/cooling and lighting systems and instructional space, such as classrooms—than more advantaged schools (OECD, 2013). This is a critical fact, given that the schools' capacity to satisfy students' needs may be hampered by this factor.

For the Latin American case, Murillo and Román (2011) find that find that the effect on the achievement of primary education may be affected by the schools 'infrastructure, services, and didactic facilities (sport installations, labs, libraries and computers), although the effect may differ from country to another. Empirical studies also show that students tend to perform better in schools that provide a conducive learning environment, with less likelihood of grade repetition, student truancy or better behavior (Jennings & Greenberg, 2009).

Furthermore, many authors highlight the difficulty that schools in disadvantaged areas have to attract and retain good teachers—a key component of the education process (Bruns & Luque, 2014; Pelayo & Brewer, 2010). Lupton (2004) argues that schools in disadvantaged areas of the UK have greater difficulties to recruit experienced teachers. In addition, these teachers face a much more challenging environment, lowering teacher quality and, in consequence, educational quality. In developing countries, UNESCO (2014) warns of unequal teacher distribution in schools depending on the socioeconomic characteristics and its consequences on rising educational inequality. Evans and Popova (2015) recommend pedagogical interventions (including computer-assisted learning) that should be implemented according to the students' the specific needs.

2.4. Electoral participation and social capital

Academic literature has not focused on the influence of electoral participation on student performance. However, we consider this could be important because a high level of electoral abstentionism might reflect significant processes of social self-exclusion. Research on political behavior has examined, mostly in the United States, the effect of

[1] This unique policy experiment, designed and implemented by the U.S. Department of Housing and Urban Development in the 1990s, aimed to shed light on whether providing assistance to low-income families to move to better neighborhoods could improve their outcomes.