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School size, class size

What is the ideal size of primary schools to optimise learning achievement? Estimates based on data from Senegal.

Economics of education research has not reached consensus on the role of school size¹ on the learning process in schools. Although many studies have looked at class size, none has investigated in any depth the effect of school size on student performance in Sub-Saharan African countries.

Many studies (e.g. Kuziemko, 2006; Beuchert et al., 2018), mainly conducted in developed countries, empirically show that small schools foster better learning. Those in favour of large schools (Conant, 1967; Callahan, 1962) cite 'economies of scale' to justify the need for larger schools. Other studies (e.g. Wyse et al., 2008) find that school size has no effect on learning achievement.

My recent research ([Koussihouèdé, 2020](#)) updates previous findings ([Koussihouèdé, 2015](#)) on the trade-off between larger schools and the quality of learning in Senegal. This study provides an opportunity to respond to this important question for developing countries.

The issue of school size in Sub-Saharan Africa

As part of the Fast Track Initiative², African countries implemented mass enrolment policies resulting in an impressive increase (around 50%) in school enrolment rates. Yet while enrolment rates have risen constantly, teacher numbers have increased at a somewhat slower pace. Pupil-teacher ratios, especially at the pre-primary and primary levels, remain high in many parts of the world and especially in Africa.

Senegal, in particular, has made progress in expanding access to education over the last decade. Between 2002 and 2012, the number of primary schools increased by 57.8 %, in part to achieve the Education for All goals. However, studies have shown that as enrolment increased, quality deteriorated (DeStefano et al., 2009).

Constructing new schools is one of the major courses of action recommended by countries in the Sub-Saharan region (including Senegal) to accommodate the growing number of enrolments. It is

therefore beneficial to study whether policy-makers should build more schools but keep them small, or allow schools to enrol more pupils. The pedagogical challenges of both options need to be taken into account.

Data and identification strategy

To answer this question, I used data collected by the World Bank and the Ministry of Education in Senegal as part of an assessment on the impact of school projects (see Carneiro et al. 2020).

In the context of this assessment, data from 440 schools and around 5,000 pupils were analysed. Doubly robust regression models were developed to measure the causal effect of school size on students' performance in French and mathematics, and to infer optimal school sizes.

Findings

The analyses indicate that school size does not affect student performance at the beginning of the learning process (grade 2). However, by grade four the negative effects of attending a large school are observed in terms of student performance in French and mathematics, both in the medium and long term. These findings were subject to several robustness analyses.

The gap between grade two and four students can be explained by the fact that grade four students have spent longer in the education system whereas, at the start of the learning process schools have not yet left their mark on younger learners, whose learning is shaped more by their family environment.

These overall findings have been complemented by analyses that demonstrate the diverse effects of school size. The effect varies in relation to urban or rural settings, class size, student gender, and the parents' socio-economic status. For each of these groups, and in line with the overall analysis, the effect makes itself known in the long term i.e. in the highest grades.

What is the optimal school size, and for what level of decision-making?

I describe a simple theoretical model for two levels of decision-making, i.e. the public policy-maker whose aim is to improve the national student performance average, and the parents who want to choose a school in which their child's individual performance will be maximised. Theoretical models highlight the opposition between the solution for policy-makers and the solution for parents.

Estimates carried out separately for urban and rural settings give the following results:

- In urban settings, policy-makers can set school size at a maximum of 325 pupils or at least of 475 pupils. For parents, the optimal size is estimated at 353 pupils.
- In rural settings, policy-makers can set school size at a maximum of 355 pupils or at least of 513 pupils. For parents, the optimal size is estimated at 470 pupils.

1. School size refers to the total number of pupils enrolled regardless of the grade.

2. The Fast Track initiative became the Global Partnership for Education in September 2011.

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