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Compensating Policies for Small Schools: Addressing Schooling Inequalities in Rural India[1]

By Anjini Kochar

Introduction

India, along with other countries, has long wrestled with considerable schooling inequalities, with children from wealthier families residing in more developed regions and performing significantly better than those from less privileged backgrounds. These differences, widely attributed to family characteristics that shape learning from very early stages, have proved difficult to reduce even through policies specifically designed to redress schooling inequalities. In this brief I suggest that the failure may lie in the policy design. All too frequently, policies are based on assumptions regarding the underlying constraints that determine schooling outcomes, assumptions that may not be valid. Additionally, the corrective measures put in place generally identify low-quality schools on the basis of a common set of indices. Because of the extensive variation in socioeconomic conditions across the country, even within a state, a common set of indices may result in the mis-targeting of funds, with more resources going to academically strong schools rather than to those in backward regions.

India's compensating policies for small schools

One example of such a policy failure comes from the government of India's policies that compensate small schools with more resources, based on assumptions regarding the determinants of learning and

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About The Author

Anjini Kochar is both a senior research scholar and India Program director at the Stanford Center for International Development (SCID). Prior to her position at SCID she was an Assistant Professor in the Economics Department at Stanford University. Kochar has a Ph.D. in Economics and an M.A. in International Relations from the University of Chicago and a B.A. from Bryn Mawr College. Her research interests include the micro-economics of development, poverty, education and health issues in developing economies.

the belief that small schools suffer from a disadvantage because of factors that affect both the supply of and the demand for quality schools. On the demand side, small communities are associated with relatively remote regions and are hence believed to be poorer and inhabited by households with lower levels of adult education. Given the critical role of household factors in schooling attainment, small communities may suffer from an initial schooling disadvantage. On the supply side, small schools generally necessitate multigrade teaching, with one teacher simultaneously teaching students of different grades in a single classroom. While multigrade teaching may promote learning in environments where the curriculum is specifically designed for the purpose, it is believed to reduce learning in systems where the curriculum is more rigid and grade specific, as it is in most developing economies. In such instances, combining students of different grades in one classroom implies a significant reduction in instructional time for each grade. Multigrade teaching is widespread in sub-Saharan Africa; it is estimated to account for 26 percent of schools in Zambia and 36 percent in Burkina Faso (Mulkeen and Higgins 2009). It is even more prevalent in Asia. In India, for example, it is practiced in 84 percent of schools.

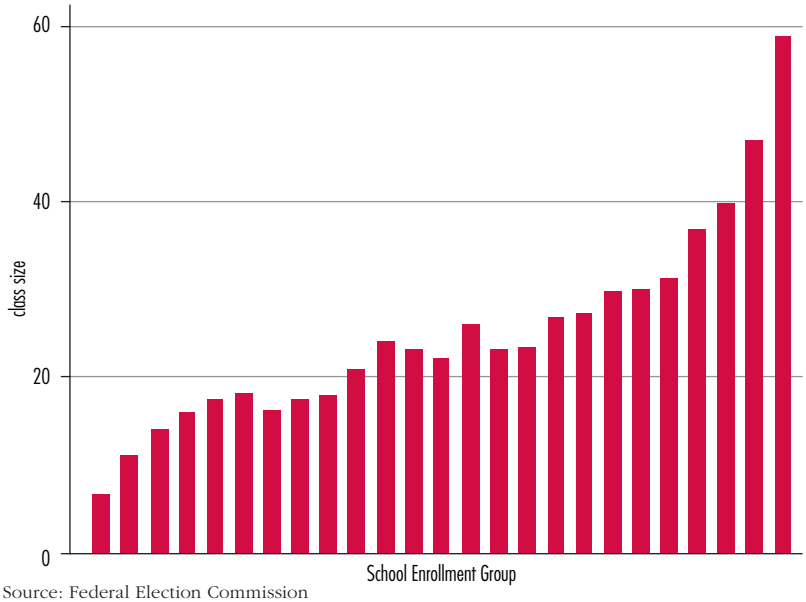
To compensate for multigrade teaching and disadvantages due to family background, India provides more teachers per student to schools with small total enrollments. In the south Indian state of Karnataka, for example, one teacher is provided for every 20 students in small schools with fewer than 90 students. In medium-sized schools, with enrollments between 90 and 280, a teacher is provided for every 30 students. This number rises to 40 in large schools. The bias in favor of small schools generated by this rule is graphically demonstrated in Figure 1, which plots class size against school enrollments. The policy ensures that class size in small schools is significantly lower than in large schools.

Unfortunately, the policy was not preceded by research on the effects of multigrade instruction on learning. Nor was any attempt made to assess the initial learning disadvantage suffered by students in small schools. Our research shows that these failures resulted in schooling policies exacerbating, not reducing, initial learning inequalities. Test scores show that multigrade teaching does not adversely affect outcomes and small schools are not necessarily serving the students with the greatest initial learning disadvantages.

Evidence on multigrade instruction and class size

There are few credible studies that establish the effect of multigrade instruction. In contrast, there is a relatively large literature on class-size effects. Evidence from developed countries such as the United States generally supports the hypothesis that small classes

Figure 1: Class size by School Enrollment Group (survey data)



Source: Federal Election Commission

improve learning (Angrist and Lavy 1999, Hoxby 2000). However, reviews of the evidence from several different countries, though supportive of the hypothesis of improved learning in small classes, find that estimates are frequently imprecisely measured (Hanushek and Luque 2003).

Research on class size in developing economies frequently maintains that the environment in these countries removes many of the challenges to empirical research (Urquiola 2006). For example, a common problem is that estimates of the effect of class size on learning may include the effect of the ability to better match students and teachers or create optimal peer groupings. This is because, in developed economies with relatively large schools, optimal class sizes are achieved by dividing a given grade into sections. However, in so doing, schools are also able to assign students to sections (and teachers) so as to maximize individual learning. If so, any estimated effect of class size may well reflect a positive return on the ability of the school to optimally group students in different classrooms. This bias does not exist in research conducted on small schools, such as those found in rural India and in other developing economies. Here, cohort sizes are too small to warrant the division of grades into sections.

However, small cohorts normally require multigrade teaching, and this introduces a different bias: Estimates of class-size effects may confound the pure effects of class size with those of multigrade teaching. To our knowledge, there are no studies that separate the effects of class size from multigrade teaching in schools that must resort to the latter. The nature and extent of the bias this introduces depends on the direct effect of multigrade classrooms and on the correlation between multigrade instruction and class size. Since multigrade classrooms are characteristic of small schools, one may expect a negative correlation between class size and multigrade teaching. However, the partial correlation between multigrade teaching and class size, conditioning on total school enrollment, is likely to be positive; within any given school, the ability to combine different cohorts in one classroom enables larger classes than might otherwise be possible.

Data and survey area

To estimate the effect of class size and multigrade instruction on learning, we use data from a survey of 720 rural schools in the southern state of Karnataka. Using tests designed by an independent testing service, we tested all third-grade students in language and mathematics. We also evaluated students on a set of noncognitive skills (leadership, social skills, communication, and confidence levels). The evaluations were based on individual and group observations of children participating in two different activities over a two and a half hour period, with each group of students assessed by two trained investigators.

Our survey data covers the entire state of Karnataka, a state characterized by considerable regional variation in socioeconomic conditions. The state was formed in 1956 by combining areas from the British state of Mysore, the Bombay and Madras presidencies, and the princely states of Hyderabad and Coorg. The districts currently located in the south of the state come primarily from Mysore and have historically been characterized by far better infrastructure, education, and health facilities. In contrast, the districts in the north and central part of the state, formerly part of the Bombay presidency and Hyderabad, had significantly lower levels of socioeconomic development at independence. In terms of schooling attainment, for example, the percentage of 6 to 11 year olds enrolled in school in 1955-56 was only 27 percent in the Hyderabad districts, compared with 85 percent in the Mysore districts in the south. These historical differences in levels of socioeconomic development persist even today. All five districts in Hyderabad-Karnataka and four out of five districts in Bombay-Karnataka have female literacy rates below the state average, while only 6 out of 15 districts in south Karnataka do. Similarly, averaging across districts, the average head count poverty index in 1999-2000 was 13.2 percent in the south, but as high as 28.8 percent in the north.

Estimates of multigrade and class-size effects

Our analysis allows for the endogeneity of both class size and multigrade instruction and confirms the importance of class size in regard to learning. We find that reducing class size significantly increases language and mathematics test scores. Smaller classes also promote the development of noncognitive skills. However, contrary to conventional wisdom and to policy assumptions, we find that multigrade instruction does not significantly affect mathematics or language test scores.[2] And, its effect on three of the four noncognitive skills we evaluate is positive. Our research suggests that the perceived negative effects of multigrade instruction may be a consequence of the larger classes that emerge when two or more cohorts are combined in a single classroom: The coefficient on multigrade instruction is negative only in regressions that do not control for class size and that therefore represent the combined "pure" effect of multigrade instruction and the greater estimated negative effect of class size.

Effects on learning inequalities between small and large schools

Our finding of an insignificant effect of multigrade instruction on learning removes one justification for the government's compensating policies for small schools. However, the positive effect of small class sizes suggests that policies that lower class size in small relative to large schools may nevertheless help overcome learning inequalities between these schools, attributable to differences in the socioeconomic backgrounds of students.

We find, however, that this is not the case: The government's program for smaller schools has increased regional schooling inequalities. The reason is that the ubiquitous assumption that smaller communities are poorer (an assumption that underlies the central government's policy of compensating small schools with more resources) is invalid.

Though villages in the southern region of the state boast better infrastructure, agricultural conditions, and higher wealth, they are much smaller than villages found in the relatively underdeveloped northern region. The average population size of villages in the south is 1,502, compared with 1,790 for villages in the north. These regional differences in village size appear to be historically determined. Data from the 1901 census reveal an average village size in Mysore of only 285, as compared with 611 for districts in the Bombay presidency and 535 from Hyderabad.

Indian villages are divided into several habitations, homogenous groupings of households along caste lines. Under Indian policy, it is the habitation, not the village, that forms the basis for school location policies, with the government committed to providing a school to each habitation.[3] Correspondingly, variation in school size reflects variation in habitation population more so than village size. Data from the All India Education Surveys reveal that size differences are even more acute at the level of the habitation. Average habitation size was only 611 in the southern districts (1,993) and almost double this figure in the north (1,183). Correspondingly, the average size of primary schools in the northern region is 178 (2009-10), relative to a size of 130 in the south.

The negative correlation between school size and the level of socioeconomic development of the village is not unique to Karnataka. Using data from the 2001 census, we divide

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2 We should note that our results relate to the multigrade context in Karnataka, where multigrade pairings are chosen so as to predominantly combine students from adjacent cohorts in any given classroom. They cannot rule out the possibility that multigrade teaching may have detrimental effects under different grade combinations or for the older students in a classroom.

3 The policy calls for a school either within a habitation or, in relatively small habitations, within walking distance of it. The central government's recommendation is that a school be provided to every habitation with a population of 300. Karnataka has a more stringent policy in place, requiring a primary school to be provided to every habitation with a population of 200.

districts in India's major states into two groups, the first with female literacy below the state median level and a second group with above-median literacy. Comparing enrollments in rural government primary schools across low and high female literacy districts, we find that many of India's states, spanning some of its poorest (Madhya Pradesh, Uttar Pradesh) and richest (Maharashtra, Punjab) states as well as other states such as Andhra Pradesh and West Bengal, also exhibit this negative correlation.

The fact that small schools cater to relatively well-off populations in many parts of the country implies that the government's policy of providing more resources to small schools benefits schools that already enjoy a substantial advantage relative to poorer, relatively large schools.

The inefficiency of centralized policies

How could this negative correlation between school size and the community's socioeconomic status have escaped attention? Beliefs regarding relative habitation sizes are shaped primarily by the division of the larger village unit into a main village and smaller associated habitations. This division is determined by caste, with the dominant castes residing in the main village and smaller, economically and socially backward castes in surrounding habitations. Throughout India, main villages are larger than associated habitations and the schools attended by children in main villages are correspondingly larger and of better quality than those attended by students from backward castes. This is supported in our survey data, which find that habitation schools are always smaller, and of poorer quality, than the larger schools of the main village complex.

However, the positive correlation between school size and socioeconomic status that exists within the narrow geographical region of the village complex does not hold across broader geographical regions. In our survey data, though habitation schools are always smaller than main village schools, the habitation schools in the backward northern region are significantly larger than the main village schools in the developed southern region.

On the basis of our results, a uniform policy that provided one teacher for every 30 students in all schools would cut learning inequalities approximately in half. In mathematics, for example, average test scores in the more advanced southern districts are 51 percent, fully 10 percentage points higher than those in the north (41 percent). The implementation of a uniform 30:1 student teacher ratio would halve this difference, raising test scores in the north to 46 percent while leaving unchanged the average score in the south.

The results of this paper highlight the inefficiency of centralized decision making in heterogeneous economies. A uniform policy that allocates resources on the basis of school size fails, primarily because the relationship between village size and socioeconomic status varies across regions. The failure, of course, is not necessarily one of centralization, but of the uniformity of the policy and the failure to use information on local conditions in the design of policies.

References

Angrist, Joshua D., and Victor Lavy. 1999. "Using Maimonides' Rule to Estimate the Effect of Class Size on Scholastic Achievement." *The Quarterly Journal of Economics* 114(2):533-575.

Hanushek, Eric A., and Javier A. Luque. 2003. "Efficiency and Equity in Schools Around the World." *Economics of Education Review* 22:481-502.

Hoxby, C. M. 2000. "The Effects of Class Size on Student Achievement: New Evidence from Population Variation." *Quarterly Journal of Economics* 115(3):1239-1285.

Mulkeen, Aidan G., and Cathal Higgins. 2009. "Multigrade Teaching in Sub-Saharan Africa: Lessons from Uganda, Senegal and The Gambia." Washington, D.C.: The World Bank. Working Paper #173.

Urquiola, Miguel. 2006. "Identifying Class Size Effects in Developing Countries: Evidence from Rural Bolivia." Review of *Economics and Statistics* 88(1): 171-177.

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