Doing the Math:

The effects of tutorial sessions over learning in Brazilian schools

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Recent results of international standardized examinations (PISA) have placed Brazilian students and schools well below the average expected for middle-income countries. These results confirm dismal performance observed year after year (and cohort after cohort) in evaluations put forth by education authorities at both national and sub-national levels. Despite efforts to implement soft (and hard) accountability systems around the country, no directive on how to improve learning processes has been put forward by regulators. The open question is what can be done particularly with students that are well behind the material they should have mastered, in particular during the transition to high-school. In the present article we evaluate in detail one of the first (if not the first) large-scale randomized evaluation of education policy initiatives in Brazil.

We report findings from a program we were called to design and implement in a subsample of the 1200 neediest schools run by the Sao Paulo state education authority. We were asked to propose a program that promoted catch up in Math materials by students in difficulty and, at the same time, guaranteed the use of underutilized school infra-structure outside regular ours. The proposal accepted from a menu of six options involved the organization of small tutorial sessions (five students at most) to be hosted by a pedagogy major student from colleges serving the school area. Two sessions per week were organized in the school of the pupil, on the afternoon-shift hours. Students in the 7th and 9th grades (middle and junior high schools) were considered eligible, as long as their past year performance in Math (transcript based evaluation) was bellow satisfactory (scoring below 7 in a 0-10 scale).

Enrollment of schools and potential tutors was done in a decentralized manner via web-based blind matchmaking engine specially designed with such purpose. Tutors could pick schools they had interest on, and schools could manifest interest in having their schools (yet could not observe if a matching occurred). Links were formed only at the programs war room, organized at the University of Sao Paulo campus.

Of the 1200 targeted schools 210 were considered appropriate for the trial (after considering physical capacity concerns and size of the targeted student population). They were then invited to manifest interest in the program after a video-conference presentation of its inner workings and after being informed that only approximately half of them could be served

during the initial stages of the pilot (and that lottery would pick those receiving the program). From these, 142 schools confirmed interest and were allowed to start offering students information and a chance to enroll in the program (students had to collect a parental consent form, were they were advised that not all interested would in fact have access). Therefore, as they entered the web-based platform groups were formed (also with student-level randomization every time oversubscription was clear) in every one of the 142 schools. After the enrollment period, schools were classified in blocks as a function of their average past performance on standardized Math tests, their pupils' demand for and their associated tutors' supply rates. From each of the blocks 2 schools were allocated treatment and at least one was placed under control status. As a result of this algorithm we had 88 treatment schools and 54 control schools.

The program was implemented during the second half of the 2011 academic year (August to November). In the present article we detail the main findings of its cost-effectiveness by looking at standardized examination (in Math and Language) at transcript records (teacher assessments) and at future matriculation records (we follow students over time into the 2012 academic year). We complement the analysis with primary data collection on cognitive ability, time use and learning strategies in Math related subjects, and some behavioral traits (self-efficacy and locus of control). We have information on all students in those grades within treatment and control schools. The design not only allows the comparison of interested students in treatment and control, but also the non-interested students (exposed to interested classmates) in treatment and control schools, allowing the measuring of spillover effects.

Our preliminary findings suggest large and significant improvements in performance in standardized Math tests (approximately .2 of one standard deviation) without apparent change in Language performance. Students exposed to the treatment are better evaluated by teachers, and such subjective evaluations seem to be more elastic that the standardized examinations, suggesting that either students master more than what is covered in the tests of that teachers may be influenced by the treatment information when evaluating the pupil. We also find that students are better organized on their approach to Math studies (they even put more time into it, beyond tutorial sessions) and are also more confident with respect to

their ability to face Math problems. Finally, treated students are more likely to enroll in high school in 2012.

Spillover effects are detected in a subsample of schools in which social interaction between pupils seems to be more prevalent. This indicates that social capital interacts with returns to the policy intervention, something that should be considering once the programs is scaled up.

This article shows that simple interventions like this can be dramatically important for the learning processes of students in the impoverished and marginalized regions within a middle-income country like Brazil.