The Effects of Performance-based Pay in Secondary Education: Teacher Incentives and Sorting[*]

Joniada Milla[†]

April 21, 2017

Abstract

This study evaluates the causal effect of an accountability and collective pay incentive program on school performance and disentangles the underlying mechanisms by using a sharp regression discontinuity design (RDD). I analyze the effect of the program on the composition of incumbent and newly hired teachers to separate two potential mechanisms that generate the impact: teachers' incentives and teacher sorting. The Chilean National Subsidized School Performance Evaluation System identifies the best performing schools, makes them public, and awards a monetary bonus that is distributed to the teachers of the winning schools. I exploit the universal coverage of this long-term program together with a unique administrative record on Chilean school teachers and student test scores. The longitudinal nature of the data allows for tracking the teachers' mobility between schools and across time. I find strong effects of the program on the composition of teaching staff: the winning schools attract more experienced and qualified teachers. Furthermore, combining the RDD with the instrumental variable approach, I show that the effect of the program on school performance operates through both mechanisms. However, the estimated effect through teacher sorting is much higher than the effect through teacher incentives. The results have direct policy implications, since in the long run teacher sorting may contribute to a widening inequality between schools, where the cost is borne by the students in non-winning schools.

Keywords: Regression discontinuity design, Program evaluation, Teacher mobility dynamics, Student achievement.

JEL Classification: I28, I21, J33, J63

Extended Abstract

This study evaluates the effect of an accountability and collective pay incentive program on schools' academic performance that is measured by standardized test scores. The main contribution of the paper is to evaluate the causal effect of the program and to disentangle the two underlying mechanisms — teacher incentives and teacher mobility across schools. The Chilean National Subsidized School Performance Evaluation System provides the appropriate setting to assess this research question for the following reasons.

First, this program identifies the best performing schools, makes them public, and awards a monetary bonus that is distributed to the teachers of the winning schools. The award allocation process is consistent with a sharp regression discontinuity design (RDD), which provides an exceptional opportunity to isolate and estimate the causal effect of the program.

Second, I combine a unique administrative record on Chilean school teachers to their students' standardized test scores. The longitudinal nature of the data allows for tracking the teachers' mobility between schools and across time since 2003 to date. Hence, I am able to analyze separately the effect of the program on the composition of incumbent and newly hired teachers in order to isolate two potential mechanisms that generate the impact: teachers' incentives and teachers' sorting. This has not been possible in previous literature since performance pay programs applied elsewhere are generally one-time or very short-lived interventions that lack a longitudinal nature which is indispensable for this analysis.

Lastly, the program has universal coverage at the national level, and the tournament that determines the winner schools is conducted within clusters. These clusters group together schools of similar characteristics such as administrative region, urban/rural location, school type, and socio-economic status. Therefore, each group has its own cut-off point, and in order to use the RDD estimation approach I normalize the cut-off points to zero. Differently from most RDD-based studies that are confined to local estimates, the clustering ensures the external validity of the results that are drawn from this analysis.

The results on school performance assert that the SNED increased average test scores in winning schools by about 4 points. I find that both mechanisms have an important role, but the programme effect stemming from the sorting mechanism is stronger: While one unit increase in incumbent teacher quality improves school performance by 5–8 points, one

unit increase in newly hired teacher quality improves school performance by 32–33 points (one third of a standard deviation). The difference between the coefficients is statistically significant. Hence, the mechanism running through the teacher sorting among schools of different quality or towards winner schools is more effective than the mechanism that modifies teacher incentives and motivation in improving school academic performance.

The primary aim of this pay-for-performance program is to improve teacher incentives towards higher effort and dedication. However, the results I find in this paper show that the program encouraged the teachers to sort across schools, which is an unintended and potentially undesirable consequence of the collective pay incentive program. While this channel is effective, it is detrimental to the students in non-winning schools. In the long run the sorting of the teachers may contribute to higher segregation and widening inequality between schools.