Time to learn? The organizational structure of schools and student achievement

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Abstract  Utilizing parametric and nonparametric techniques, we assess the impact of a heretofore relatively unexplored ‘input’ in the educational process, time allocation, on the distribution of academic achievement. Our results indicate that school year length and the number and average duration of classes affect student achievement. However, the effects are not homogeneous – in terms of both direction and magnitude – across the distribution. We find that test scores in the upper tail of the distribution benefit from a shorter school year, while a longer school year increases test scores in the lower tail. Furthermore, test scores in the lower quantiles increase when students have at least eight classes lasting 46–50 min on average, while test scores in the upper quantiles increase when students have seven classes lasting 45 min or less or 51 min or more.

Keywords  Student achievement · School quality · Stochastic dominance · Quantile treatment effects · Inverse propensity score weighting

JEL Classification  C14 · I21 · I28
1 Introduction

The stagnation of student achievement over the past few decades in the United States is well-documented (e.g., Epple and Romano 1998; Hoxby 1999), despite the fact that per pupil expenditures have increased an average of roughly 3.5% per annum over the period 1890–1990 (Hanushek 1999) and that aggregate public expenditures on primary and secondary education total approximately $200 billion (Betts 2001). Given the discontinuity that exists between educational expenditures and student achievement, an important body of research has emerged attempting to discover the primary influences on student learning. However, a potentially important ‘input’ in the educational process that has been overshadowed is time allocation; specifically, time spent in school and time spent in classes.

To partially address this gap, we assess the impact of several measures of the organizational structure of the learning environment on student achievement. In particular, we focus on the (1) length of the school year, (2) number of class periods per day, and (3) average length per class period. There are several reasons a priori to believe that such variables may impact student learning. First, as found in Eren and Millimet (2005), the organizational structure of the school day affects student misbehavior, as measured by the number of instances in which a student is punished for disobeying school rules, receives an in-school suspension, receives an out-of-school suspension, and skips class. Moreover, Figlio (2003) documents that disruptive student behavior adversely impacts the test performance of peers. Second, there may be advantages to different organizational structures in terms of optimally conveying information and minimizing repetitive teaching activities. Finally, school year length directly affects the amount of time students spend in school, and may impact the curriculum choices of schools. For instance, Pischke (2003) finds that shorter school years increased the probability that students had to repeat a grade level, although he finds no long-run adverse impact.

From a policy perspective, the findings reported herein should be of substantive interest. Since such organizational details are well within the control of school administrators and/or state policymakers, the policy implications are obvious. Moreover, re-organization of the school day is relatively costless, especially relative to other educational policies such as reductions in class size. Altering the length of the school year, on the other hand, is not budget-neutral. For example, the Texas state legislature is currently finalizing legislation that would require all school districts to have a uniform start date for the school year after Labor Day, and end no later than June 7 (Dallas Morning News, 13 May 2005, p 20A). Proponents of such a legislative mandate argue that early school year start dates cost the state of Texas an estimated $332 million annually in foregone tourism revenue, and as much as another $10 million due to the electricity costs from cooling schools during the month of August, not to mention additional teacher salaries (Strayhorn 2000). Advocates of the earlier start date are concerned that student academic achievement would suffer from a shorter school year. Thus, empirical evidence on the link between school year