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The long-lasting effects of school entry age: Evidence from Italian students☆

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Abstract

Using data for 9, 13 and 15-year-old students from three different datasets (PIRLS-2006, TIMSS-2007 and PISA-2009), we investigate whether the age at school entry affects children school performance at the fourth, eighth and tenth grade levels. Since student's age in a grade may be endogenous, we use an instrumental variable estimation strategy exploiting the exogenous variations in the month of birth coupled with the entry school cut-off date. We find that younger children score substantially lower than older peers at the fourth, the eighth and the tenth grade. The advantage of older students does not dissipate as they grow older. We do not find any significant effect of the relative age of a child with respect to the classmates' age. Finally, we show that secondary school students are more likely to be tracked in more academic schools rather than in vocational schools if they are born in the early months of the year. From a policy point of view our results suggest that it might be useful to postpone the entry at school of children, or at least pupils should be prevented to anticipate the age of their entry at school. Tracking should also be delayed.

JEL classification: I21; I28; J13; J24

Keywords: School entry age; Educational production function; Student achievement; Choice of track; Instrumental variables

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1. Introduction

What is the optimal age for children to begin school? Do the effects of age on achievement, if any, tend to persist as children grow older? Are there consequences of school entry age when individuals enter in the labor market? To answer these questions, a growing economic literature is investigating the effects of school entrance age on student achievement and on individual labor market performance.

In modern educational systems, due to a single annual cut-off date, all children born in a given cohort enter at school at the same time. For example, in Italy children turning six by the 31st December have to start school in September of the relevant year. This implies that in the same class some pupils – born in the early months of the year – are significantly older than other pupils born in the later months.

Younger pupils, who have not yet reached a sufficient level of maturity, may have more difficulties in learning and concentration and may accumulate less skills for any period of time spent at school. The problem is particularly relevant if the initial disadvantages of younger children are not canceled along time and if, as Heckman (2000) points out, "early learning begets later learning and early success breeds later success just as early failure breeds later failure".

The organization of the educational system may exacerbate the problem of younger entrants if there exists tracking and students are separated into different groups or are assigned to academic or vocational tracks according to their initial educational achievement. In such a system, initial lower performance can translate in long-term consequences affecting adult labor market outcomes.[1]

We investigate the effects of the month of birth on school performance of Italian students using three different, well-known, datasets analyzing the achievement of students in different subjects and at different stages of their scholastic career. Firstly, we study pupils' performance in Reading Literacy at the fourth grade using the 2006 PIRLS-Progress in International Reading Literacy Study. Secondly, we focus on Mathematics and Science knowledge for children at the fourth grade (approximately 9-year-olds) and eighth grade (13-year-olds) using the 2007 TIMSS-Trends in International Mathematics and Science Study. Finally, we deal with 15-year-old students, in their upper secondary school, using the 2009 PISA – Programme for International Student Assessment, reporting the type of secondary school chosen and students' performance in the fields of Mathematics, Science and Reading Comprehension.

The use of these datasets allows us to verify if there is an effect of the month of birth on school performance for 9-year-old students and if the effect of age remains stable or tends to decline as students progress along their career until students are 15 years old.

Since in Italy, as in many other countries, parents have some discretion on when their child starts school and teachers may decide if a pupil has to be retained in a grade, the student's age in a grade is not exogenously determined and may be correlated to observable and unobservable factors affecting school performance. Therefore, OLS estimators may yield biased results. Following the existing literature, we adopt an instrumental variable (IV) estimation strategy using as an instrument for the student's actual age the "expected age", that is, the age a student should have on the basis of his/her month of birth and of the established cut-off date.

We firstly show that younger children obtain significantly lower performance than older ones at the fourth grade. Starting school 11 months older causes an increase ranging from 0.20 to

[1] A number of factors affect students' performance especially in terms of equality of opportunities (Annabi, Harvey, & Lan, 2011; Mongan, Santin, & Valiño, 2011; Murillo, Rahona-López, & del Mar Salinas-Jiménez, 2012).