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Peer effects in early schooling: Evidence from Brazilian primary schools



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ABSTRACT

Empirical investigations of peer effects on student achievement are often challenged by methodological problems related to the simultaneous influence of peer interactions and selection bias. To minimize these problems, I estimate peer effects controlling for school fixed effects and using educational data at school entry, when students' baseline performance has not been influenced by their peers and ability grouping is less common because schools have unclear information about the ability level of incoming students. Using longitudinal data from Brazil, I compare students at the beginning and at the end of first grade to see whether classroom composition with respect to peers' academic performance impacts students' achievement gains in their first year in school. Consistently with previous literature, results suggest that students learn more when they attend classrooms with higher achieving peers. Whereas classroom heterogeneity in terms of peers' ability tend to have a negative but small effect on achievement gains in first grade. Empirical investigations of peer effects on student achievement are often challenged by methodological problems related to the simultaneous influence of peer interactions and selection bias. To minimize these problems, I estimate peer effects controlling for school fixed effects and using educational data at school entry, when students' baseline performance has not been influenced by their peers and ability grouping is less common because schools have unclear information about the ability level of incoming students. Using longitudinal data from Brazil, I compare students at the beginning and at the end of first grade to see whether classroom composition with respect to peers' academic performance impacts students' achievement gains in their first year in school. Consistently with previous literature, results suggest that students learn more when they attend classrooms with higher achieving peers. Whereas classroom heterogeneity in terms of peers' ability tend to have a negative but small effect on achievement gains in first grade.

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1. Introduction

Peer effects have long been of concern to scholars interested in how the distribution of students between and within schools may affect educational outcomes. If the composition of peers in learning settings affects academic achievement, the sorting of students across schools and classrooms with respect to ability and demographic characteristics may have serious implications for social inequalities

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In this study, I explore classroom peer effects on student achievement in the very early stages of schooling. In contrast to previous studies that measure peer effects at the end of primary school (Hoxby, 2000; Hanushek, Kain, Markman, & Rivkin, 2003; Lefgren, 2004; Zabel, 2008), I investigate peer effects at school entry. Specifically, I investigate whether classroom composition has an impact on students' achievement in first grade. By focusing on data at school entry, the current analysis improves on previous studies both conceptually and methodologically. From a conceptual perspective, this study offers a unique opportunity to explore the influence of peer group composition for young children, contributing to an expanding body of literature that shows the impact of early educational experiences on children's development. From a methodological perspective, by restricting the sample to first graders, I minimize two important sources of bias in the estimation of peer effects, namely, the reflection problem—i.e. simultaneous influence between students and their peers—and selection bias. With respect to the former, because the peer measures I use are based on data collected at the moment students enter the school, a student's own ability is not reflected in the baseline peer quality. Moreover, using data at school entry reduces the likelihood of selection effects because schools have less information about incoming students to group them on the basis of their ability level.

This paper uses unique panel data from Brazilian primary schools. First, I estimate how much of the variation in student achievement in both mathematics and reading is explained by the ability level of peers in the classroom—what I call *classroom peer quality*. Second, I analyze the impact of the variation in student ability at the classroom level—that is, *classroom peer heterogeneity*—on student achievement. I also analyze whether peer quality and heterogeneity have differential effects for students in public and private schools and at different levels of the achievement distribution.

A significant problem in previous studies of peer effects is that it can be hard to distinguish the effects of students' self-selection into schools and classrooms from the true influence of peers on academic performance. I employ multiple strategies to deal with selection bias. First, I use school fixed effects to control for non-random sorting of students across schools. Unlike the United States and some European countries, Brazil does not *officially* employ any sort of ability grouping between classrooms. As a result, peer effects should not be strongly biased by within-school selection. Yet even in the absence of a clear policy to guide class assignment, it is likely that schools are sorting students informally in ways that could bias the estimates. However, as mentioned above, using data at school entry reduces the possibility of selection bias because, even if schools informally promote ability tracking, they will not have clear information about students' performance at the beginning of the first grade. I further use a comprehensive set of student and teacher covariates to correct for possible bias due to self-selection into classrooms. Lastly, like Vigdor and Nechyba (2004) and Zabel (2008), I also identify schools with potential random allocation of students to classrooms and report peer effects results separately for them.

The results indicate that, controlling for students' ability at school entry, their performance at the end of first grade is higher when they attend classrooms with higher peer quality, which is measured by the classroom average achievement and the percentage of high achieving students in the classroom. In the overall sample, peer quality effects range from 0.118 to 0.166 standard deviations. When using the restricted samples of schools that appear to have a random distribution of students, peer effects are also positive but not all estimates are statistically significant. Peer heterogeneity effects are mostly small and non-significant, but few estimates show that more heterogeneous classrooms may lower student achievement. Finally, there is evidence that higher achieving students might benefit more from being in homogenous classrooms with other higher performing peers.

In addition to providing a conceptual and methodological contribution by examining peer effects at school entry, this paper also aims to deepen our understanding of cross-cultural variation in peer effects by extending the discussion on the subject to the Brazilian context. A large body of literature on the impact of peer group composition is based on data from the U.S., where studies of peer effects have played an important role in shaping education policies such as school choice, tracking, and school desegregation (Dills, 2005; Gamoran, 1992; Guryan, 2004). Although research on peer effects has also been conducted in other country settings, most of the international literature investigates the effects of school organization on student performance in developed countries—in particular some European countries where the segregation of peers into different academic tracks occurs at early ages (Ammermueller & Pischke, 2009; Hanushek, 2006). In developing countries with high levels of socioeconomic school segregation such as Brazil, the investigation of peer effects is not trivial given that peer quality varies considerably between schools (Willms & Somer, 2001). This study could inform policy decisions with respect to school organization to improve learning opportunities of students from diverse social backgrounds.

2. Peer effects literature

The educational implications of different school or classroom arrangements with respect to peers' ability or socio-demographic characteristics have been widely discussed in the literature (Hanushek et al., 2003; Hoxby & Weingarth, 2005; McEwan, 2003; Willms, 1986). In his famous report on equality of educational opportunities, James Coleman (1968) showed that the academic achievement of black students was positively related to the number of white children in their schools. This finding has been held responsible for the desegregation busing movement in the United States in the late 1960s, and continues to inspire studies on integration programs that promote racial mixing in schools (Angrist & Lang, 2002).

This paper focuses on the composition of classrooms with respect to peer ability. Following previous research, this study analyzes the effects of the level of peer achievement—that is, *peer quality*—and the variation in peer ability—or *peer heterogeneity*. Peer quality has been represented in different ways in the literature, including models that focus on the average achievement of peers or on the number of low and high achievers in a classroom or school (see Hoxby & Weingarth,

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