Economics of Education Review 54 (2016) 62–78

Contents lists available at ScienceDirect

Economics of Education Review

journal homepage: www.elsevier.com/locate/econedurev

Good peers or good teachers? Evidence from a French University☆

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ARTICLE INFO

Article history:
Received 30 June 2015
Revised 28 June 2016
Accepted 30 June 2016
Available online 7 July 2016

JEL Classification:
I21
I23
I28

Keywords:
Higher education
Peer effects
Teacher effects
Random assignement

ABSTRACT

Using a quasi-random allocation of students to classes in a French university, we are able to estimate peer effects and teacher effects, with a specific attention to non-linear peer effects. We find that teacher effects are strong, as found at other levels of the education system, but that peer effects have very limited impact. This implies that restricting student access to some universities is of no benefit to remaining students in terms of academic performance. In contrast, attention to teacher performance should be strong at the higher education level.

1. Introduction

Students and teachers are the main inputs into the educational production function and both have received a great deal of attention among economists in the recent period. The allocation of students has been hotly debated. Mixing classes may have distributional impact, which depends on the very shape of peer effects, because sorting students would create winners and losers. Mixing classes can also be desirable for efficiency reasons: it is generally efficient to generate heterogeneous groups if peer effects are stronger for low ability students. Therefore, the existence, importance, and details of the structure of peer effects are decisive to several major policy issues. The empirical literature on peer effects is abundant but usually finds limited cognitive impacts of various allocation schemes (Brodaty, 2010; Sacerdote, 2010, 2014). On the other hand, teachers receive increasing attention from both researchers and policy makers, who consider incentives and training policies. Teachers are typically found to account for a large share of the variance in students' cognitive outcomes (Rivkin, Hanushek, & Kain, 2005).

In this paper, we simultaneously estimate the contribution of teacher and student class structure to cognitive outcomes of undergraduate university students at an

☆ We thank Paris-Dauphine University for giving us access to the data, and Bernard Guillochon and Jean-Marie Janod for their help in collecting the data. We thank seminar participants at CREST, Paris-1, Evry, Cergy, UPEC, AFSE, JMA, CEPR, two anonymous referees and the editor for useful suggestions and comments. The usual disclaimer applies.

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http://dx.doi.org/10.1016/j.econedurev.2016.06.005
0272-7757/

elite French university. Using a quasi-experimental setup, in an environment where students work exclusively in small classes, we estimate the impact on initially high- and low-performing students of having initially high- or low-performing peers in the class. We compare the impact of being allocated good students with that of being allocated good teachers. We find that teacher quality is far more important than peer quality as a determinant of cognitive improvement.

We use data from almost 3000 inflow undergraduate economics students over the academic years 2002/2003–2006/2007[1] with around 15 different teachers per subject. We allow the composition of academic quality in the classroom to affect students of different ability differently. As is well understood since Manski (1993) seminal paper, identification of peer effects is difficult. We do not attempt to estimate *endogenous effects*, that is to say, coordination in current behavior. We only consider a reduced form of the peer effects model and estimate the impact of predetermined measures of academic ability. Even then, the challenge lies in separating the effect of peer characteristics from unobserved individual qualities if peers are matched on the basis of their potential performance. This happens for instance when classes are formed by skill level. We will argue that in this university, group formation is *as good as random*, and we test for this. Accordingly, teacher allocation to groups is also as good as random. This allows straightforward identification of the set of peer and teacher effects.

The higher education context raises specific questions. It is usually more selective than compulsory education, so we should wonder whether it is efficient for universities to be strongly stratified? Also, access to higher education is growing in most countries: should this have any visible impact on performance because of the change in peer environment? Our results suggest that these are not first-order concerns.

Although there is recent empirical literature on peer effects in the classroom, some of which considers their very shape, there is only limited evidence on higher education. Arcidiaccono, Foster, Goodpaster, and Kinsler (2012), Braga, Paccagnella, and Pellizzari (2014), De Giorgi, Pellizzari, and Redaelli (2010) and De Paola and Scoppa (2007) find some peer effects in such a context. Some of these papers only document average effects. Non-linear effects are considered in detail in the context of higher education by Booij, Leuven, and Oosterbeek (2014), who do find non-linear peer effects. On the other hand, much of the literature on higher education considers social interactions between roommates, not classmates, which may be less relevant to the organization of education (Carrell, Fullerton, and West, 2009; Foster, 2006; Kremer & Levy, 2008; Lyle, 2007; Sacerdote, 2001; Stinebrickner & Stinebrickner, 2006; Winston & Zimmerman, 2003; Zimmerman, 2003). Generally, these significant effects are modest with respect to those found on other non-academic outcomes in higher education (Sacerdote, 2014).

In contrast, quantitative research on teacher effects at university is more limited, to the best of our knowledge. Carrell and West (2010), Braga et al. (2014) and Hoffmann and Oeropoulos (2009) all find teacher effects on student outcomes, although of a lower order than ours.

Although our peer effects can be precisely estimated with this sample, we find a very small and insignificant impact of class composition on individual student performance. Carrell, Sacerdote, and West (2013) have recently argued that endogenous social interactions within groups can hamper the potential benefits of mixing students by ability, something that may be happening here. In contrast, teacher effects are strong: a one standard deviation increase in teacher quality results in a more than 20% standard deviation increase in students' scores. Naturally, the external validity of the peer effects estimated in this context is questionable. This university is a strongly selective one by French standards, and one in which all teaching is given in small classes, an exceptional situation in undergraduate studies. As a result, neither the technology nor the population is typical. However, this is an exceptional laboratory for learning more about the very structure of peer and teacher effects and assessing them simultaneously.

The paper is organized as follows. Section 2 presents the institutional context and data, Section 3 introduces the model and discusses the identification strategy, Section 4 presents the empirical results and Section 5 concludes.

2. Institutional context and data

We consider an undergraduate economics program of an elite French public university, with a typical yearly inflow of 700–800 students. Students are assigned to small classes of about 25–30, and all the teaching is given at the class level. There are no lectures given to the whole cohort and the classes are fixed for the whole academic year. This is a very favorable situation for observing peer effects and teacher effects in higher education.

We consider the first year of the program (i.e., the first year of undergraduate studies) and we observe year-end exam grades and teacher tutorial marks in the following five subjects: Math (first semester), Microeconomics (first and second semester), Statistics (second semester) and Computer Science (second semester).[2] Many teachers teach the same subject in several classes, and occasionally also teach several different subjects. Table 1 shows that in each subject the team is composed of around 15 teachers, between 25% and 50% of them teaching two classes, depending on the subject and the year.

The year-end grades in each of the five subjects are based on a general exam that is common to all students. It is thus comparable across classes. However, it is different every year, so that between-year comparison may not

[1] For simplicity these academic years are denoted by 2002–2006 hereafter.

[2] These five subjects are quite homogeneous in the sense that they rely strongly on formalized mathematical skills: this makes reasonable the required assumption that given measures of individual and peer quality have similar impacts on marks in these subjects.