Factors Influencing Student Performance in Economics:

Class and Instructor Characteristics[1]

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Of the numerous characteristics that influence student performance in economics classes, this chapter focuses on the role played by characteristics of the instructor, different course policies, and the nature of the class environment.[2] We begin with a discussion of various instructor characteristics such as gender, nationality, quality and experience. Next, we highlight the importance of course policies including graded problem sets and mandatory attendance. Finally, we discuss other elements of the class environment that may influence performance and the study of economics. These elements include class size, seating location, and the mathematical rigor of the class. We write this chapter with two audiences in mind: faculty who wish to improve their students' learning by seeking changes they can influence, and administrators controlling some of the remaining factors that faculty cannot manipulate.

Evaluating the role of class and instructor characteristics on student performance necessitates some discussion of measurement.[3] Many different measures of student achievement matter beyond grades within a particular course; namely, whether the student decides to drop the economics course in question, the extent to which students take additional economics courses, the decision to major or minor in economics, overall attrition in school, or the pursuit of a

graduate degree in economics or a related field. The research surveyed uses a number of these measures, though most focus on grades within a particular class.

Instructor characteristics

We begin our survey with a discussion of the importance that instructor characteristics play in affecting student outcomes in economics. While this chapter focuses on the discipline of economics, a large body of literature addresses how instructor characteristics affect student outcomes in post secondary education.

Instructor gender

One of the big questions facing researchers and academics is the underrepresentation of women undergraduates in certain academic fields such as math and science. One explanation put forth for this student gender gap is instructor gender.

Within the discipline of economics, a number of studies have analyzed the role of instructor gender on student outcomes, examining effects on both grades in principles of economics courses and further study in economics. Dynan and Rouse (1997) find no effect of instructor gender on the decision to pursue an economics major. Robb and Robb (1999) obtain similar results: instructor gender has no effect on either performance in economics or the decision to continue in economics and this holds true for both men and women. Results by Jensen and Owen (2001) show that instructor gender does not strongly influence the decision to major in economics for students in general, although it does influence students who were not predisposed to continuing in economics when they signed up for their first course. Thus, they find that instructors are more likely to 'encourage' students of the same gender to take another

economics course. McCarty et al. (2006) also show that matching student and instructor gender increases student improvement on the Test of Understanding College Economics (TUCE).[4]

The mixed results found in the economics literature are consistent with the broader higher education literature on the effects of instructor gender on student outcomes. Canes and Rosen (1995) show that the proportion of female faculty in a particular department is not related to students' major choices. However, their study is limited by the fact that they rely on aggregate measures rather than on microdata of the gender of particular instructor/student combinations. Bailey and Rask (2002) use detailed information obtained from student records, transcripts, and faculty records to study the impact that instructors have on the probability that students will pursue particular majors. They find significant 'role model' effects: students that take introductory courses from instructors of the same gender are more likely to pursue a major in that department. This effect holds both for men taking courses from male faculty, and women taking courses from female faculty.

Bettinger and Long (2005) get mixed results on the effects of instructor gender on student course choice. Female students who have a female instructor in introductory mathematics, geology, sociology, or journalism courses are more likely to take an additional course in the respective field. However, in other fields, there are no significant role model effects. Having a female instructor does not increase the likelihood of pursuing additional courses in fields such as engineering, physics, and computer science.

One difficulty of this literature is that some students may self-select into classes that are taught by instructors of the same gender. To address this issue, Carrell et al. (2010) take advantage of a random assignment of students to professors in the U.S. Air Force Academy and find that although instructor gender has little impact on male students, it significantly affects

female students' performance in math and science classes, their probability of taking additional math and science courses, and their likelihood of majoring in math, science, or engineering. Hoffman and Oreopoulos (2009b) focus on first year courses in order to limit selection issues because first year students cannot easily identify instructors. In contrast to Carrell et al. (2010), they find that having a same-gender instructor only marginally impacts student grades and the likelihood of dropping the course and does not have a significant effect on continuation of further courses within the department or major choice.

Instructor race/nationality

Another instructor characteristic that has often been linked to student performance and outcomes in higher education is nationality and/or race. Several papers analyze whether foreign born instructors have an effect on student outcomes in economics courses. An early study by Watts and Lynch (1989) indicates that teaching assistants at Purdue University that were non-native English speakers had negative learning effects on students in a principles of economics course. Evidence from Borjas (2000) is also consistent with this study. For students in a large intermediate microeconomics class, those assigned to a tutorial section with a foreign born teaching assistant perform worse than those with an American born teaching assistant. However, Fleisher et al. (2002) find little evidence that foreign born teaching assistants adversely affect student performance in a principles course. In fact, their results show that in some cases, foreign born TAs have *positive* effects on student grades in economics course.

There is also research looking at the effect of student-instructor match along racial lines. Bailey and Rask (2002, also discussed above) find that minority students are more likely to continue studying economics when they have a minority faculty member as an instructor at the

introductory level. Price (2010) shows that black students are more likely to continue in the fields of science, technology, engineering, or mathematics when they have black instructors at the introductory level. These results are consistent with the broader literature on the effects of having an own race teacher in primary and secondary school. Klopfenstein (2005) finds that increasing the percentage of high school math teachers that are black increases the likelihood that a black geometry student will enroll in a subsequent rigorous math course. There is also research that suggests that teacher perceptions of student performance and effort are strongly affected by racial dynamics (Dee, 2004). Specifically, both white and minority students are likely to be perceived more negatively by a teacher of a different race.

Instructor quality

Instructor quality is another dimension which may affect college student outcomes. Of course, defining quality is not an easy task, and the literature uses a variety of measurements. Instructor quality is often proxied by indicators such as tenure-track or not, part- or full-time, rank, salary, publication record, etc. The evidence on these effects is mixed. In Ehrenberg and Zhang (2005), the share of faculty employed in part-time or full-time non tenure-track positions is negatively related to graduation rates across a broad set of institutions, based on aggregate data. Bettinger and Long (2010) find that the number of adjunct instructors in a department has either zero or positive effects on student interest in a particular field. The largest positive effects are present in the fields of education, engineering and the sciences. Hoffman and Oreopoulos (2009a) show that instructor traits such as faculty rank, salary and employment status (part versus full time) do not have significant effects on student performance. However, they find that subjective course evaluations are strongly linked with grades and future course choices. Students who take courses

with instructors that generally receive high teaching evaluations receive higher grades, are less likely to drop the course and more likely to continue taking similar courses in future years.

Two innovative studies attempt to improve our understanding of professor quality impacts by measuring how students in introductory courses perform in subsequent courses that build upon the introductory course. Carrell and West (2010) analyze data from the exceptionally controlled curriculum of the U.S. Air Force Academy (USAFA), where there is a strict course sequence for students that does not depend on performance in previous courses, and where many students take common exams across different sections of the same course. The authors find that professors who 'teach to the test' and promote higher grades in their own contemporaneous courses actually have *negative* effects on the grades in future related courses. Students also reward teachers who provide value added to grades in current courses, but give lower evaluations to those who promote more permanent learning, as measured by performance in future courses. In related work, Fleisher et al. (2009) use data for nearly 50,000 enrollments in almost 400 offerings of principles of microeconomics, principles of macroeconomics, and intermediate microeconomics. In this study, learning, measured by future grades, is unrelated to student evaluations (once current grades have been controlled for) even though student evaluations are strongly related to grades.

Course policies

Recitation session

We now turn our focus to various course policies that may affect student learning. Having recitation sessions increases the number of contact hours a student has with an instructor, which may boost student learning. Huynh, Jacho-Chavez and Self (2009) find that introductory

economics students who attend a recitation session (induced with grade incentives) improve their final grade by a third of a letter grade. Importantly, to overcome ethical constraints that limit some experimental studies, students were allowed to select into the recitation sessions (for example, the treatment group) rather than being randomly assigned and the authors controlled for student selection on observables with econometric techniques.[5,6]

Required homework

A few studies analyze the effect of homework assignments on student performance in economics courses. There are two main reasons that required and graded homework might affect student performance. Required homework may increase the amount of time spent studying material if students would not necessarily complete optional assignments. Also, if students know that assignments count towards their final grade, they may take them more seriously. This may enhance the learning that occurs during the completion of homework. Grove and Wasserman (2006) show that graded homework increases student performance by a third of a letter grade in an introductory economics course, relative to students in a parallel course taught by the same professor in the same semester without graded homework. Freshmen especially experienced this effect, a particularly important result given the high attrition rate among college students. Emerson and Mencken (forthcoming) design a comparable experiment using weekly, online, automated-graded homework assignments (via Aplia) —for one group, the final grade included the online homework grades, whereas for the other group, the online homework grades did not affect the course grade. In this study, students with the homework grade incentive perform about a third of a grade better on the final exam, but not on the TUCE, than the control group.

Mandatory attendance

Numerous studies report a positive association between class attendance and performance (for example, Marburger, 2006; Romer, 1993; Durden and Ellis, 1995), but to claim causation requires addressing the possible endogeneity between attendance and grades. To address this problem, two recent studies use panel data sets of higher education institutions to take account of the effect of unobservable factors correlated with attendance, such as ability, effort and motivation: Arulampalam et al. (2007) for economics student cohorts at a UK university and Stanca (2006) for introductory economics students at the University of Milan. Stanca (2006) concludes that attendance has a small significant effect on performance; specifically, a single missed lecture lowered exam grades by half of a percentage point. While also concluding that missing classes leads to poorer performance, Arulampalam et al., (2007) find that absences are most detrimental for better-performing students.

Dobkin, Gil and Marion (2010) address the endogeneity concerns by using a regression discontinuity design to study the effect of a policy of mandatory attendance for all students who score below the median on the first of two exams in three intermediate economics courses. They find that the post-midterm attendance was 36 percentage points higher for the compulsory attendance students just below the median grade, relative to those just above; students who increased attendance that much experienced more than half a standard deviation increase in performance on the final exam.

Class characteristics

Class size

Persistent fiscal pressures encourage assigning more students per class to save money. Ultimately, good policymaking requires a cost-benefit analysis weighing any detrimental student outcomes against the cost savings of larger classes (for example, Krueger and Whitmore's [2001] analysis of Project STAR). Here we review what is known about (1) whether class size affects college students', especially economics students', achievement, (2) if so, by how much, and (3) for what students are the benefits the greatest? Although considerable attention has been paid to the role of class size and student performance in K-12 education, class size varies much more dramatically in higher education, for example, student class size within many institutions varies widely from fewer than 10 in seminars to more than 500 for some introductory classes.

In elementary and secondary education, a number of studies that use experimental and quasi-experimental data show strong evidence that larger classes reduce learning (Krueger, 1999; Krueger and Whitmore, 2001; Angrist and Lavy, 2001; Urquiola, 2006), although other studies indicate little effects (Hanushek, 1999; Hoxby, 2000).[1] So, why might class size matter? Lazear (2001) theorizes that student behavior, namely disruptive in nature, links class size and student achievement. In the context of the collegiate classroom, where more self-directed learning occurs, large classes may reduce attentiveness and decrease the time available for individual students during office hours. Larger classes may also leave instructors little alternative to lecturing and to multiple choice exams. On the other hand, there may be mitigating factors that decrease the negative effect of large classes. Students and faculty may compensate for larger classes, altering their behavior by, for example, students' studying more outside of class and instructors specifically preparing for a large class.[7]

[1] See Schanzenbach (2010) for a brief review of this literature.

Studies of college student learning of economics and class size variation typically evaluate introductory courses and largely find no negative effects on standardized test scores of class sizes greater than 20 students (Kennedy and Siegfried, 1997). Beyond test scores, though, enrollment in large classes is associated with the following negative effects: (1) greater attrition from the course (Becker and Powers, 2001), (2) less enjoyment of the course, controlling for course grades (McConnell and Sosin, 1984; DeCanio, 1986), (3) lower student evaluation of teacher effectiveness (controlling for instructor and course fixed effects—Bedard and Kuhn, 2008), and (4) less subsequent enrollment in economics courses (Maxwell and Lopus, 1995).

Kennedy and Siegfried (1997) evaluate the impact of class size using TUCE III data for 36 introductory microeconomics and 33 introductory macroeconomics classes taught by many different professors at many different institutions of higher education with class sizes ranging from 14 to 109. They find that once proper control is made for student ability, class size does not influence achievement. As the authors note, a standardized exam comprised of multiple choice questions provides a limited measure of student achievement. They argue that the lack of class size impact is due either to the fact that faculty fail to teach classes of different sizes differently or that different class sizes affect some students positively and others negatively.

Two recent studies—one including data about economics courses but both focused on college students generally—find strong negative effects of larger classes. Kokkelenberg et al. (2008), using data for over 760,000 undergraduate observations at a northeast public university, find average grade point declines as class size increases, precipitously up to twenty students and then more gradually beyond that. The negative effect holds for economics courses (and those in other disciplines), controlling for peer effects, student ability, year of student, level of course, gender, and minority status.

Using data for master's students at a leading UK university between 1999 and 2004, Bandiera et al. (2010) estimate class size effects from within-student variation based on their scores on end-of-semester standardized exams. They find large and negative effects only for the smallest and largest classes, but not for intermediary sizes. More precisely, moving a student from a class of 10 to a class of 25 students or from 25 to 45 lowers their exam score by around 12.5 percent of within-student standard deviation, whereas moving from a class of 80 to one of 150 caused a further 25 percent drop. Interestingly, the best performing students are most hurt by increases in class size, the reverse of what largely has been found for elementary and secondary students (see Schanzenbach, 2010).

Other class characteristics

In a multi-school study of on-line versus in-class student learning of principles of economics, Coates et al. (2004) show that selection-corrected TUCE scores were significantly lower for the on-line course, especially so for first and second year students. In Dills and Hernandez-Julian (2008), there is some evidence that college students generally earn higher grades in classes that meet more often. In addition, students appear to perform better in late afternoon classes that they select into. There is even evidence that where you sit in a classroom affects exam performance (Benedict and Hoag, 2004). Specifically, students that are forced to move closer to the front of the classroom tend to receive higher grades, despite their preferences for seats in the back of the classroom.

Conclusion

Given the fiscal pressures facing colleges and universities, faculty and administrators should have a clear understanding of the benefits of policy variables, for example class size and pedagogical approaches, on student outcomes. Among academics, economists have the necessary analytic methods to provide comparative cost-benefit analyses of higher education policies to improve student achievement. Thus, what economists and higher education administrators need is a systematic research plan to conduct experimental studies, like what we have reported regarding class size, to evaluate the efficacy of different pedagogical approaches and of policy variables, like online classes, the day and time of classes, and split or single course introductory economics classes.

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[1] For helpful comments, we thank the co-editors of this volume and Elizabeth Jensen.

[2] A survey of the relationship between student characteristics, behavior and performance in economics can be found in the chapter bearing that name in this volume.

[3] For information on measuring student performance, see the chapter on Methods of Assessment in the College Economics Course in this volume.

[4] For a description of this and related measurements, see the Measurement Techniques of Student Performance and Literacy: College and High School chapter in this volume..

[5] Econometric techniques especially useful for economic education research are further described in the Data and Econometrics Techniques chapter in this volume and in "Econometric Training Modules," developed by William Becker: http://www.vanderbilt.edu/AEA/AEACEE/Econometrics_Handbook/index.htm (accessed 11 May, 2011).

[6] Although Huynh, Jacho-Chavez and Self (2009) argue for the efficacy of cooperative learning which was the pedagogical approach used in the recitation sessions, they actually test attendance versus non-attendance at recitation sessions (not a cooperative learning versus a non-cooperative learning session). Thus, one may interpret their results more broadly as the impact of attending a recitation session.

[7] For more information about how instructors prepare for such classes, see the Making the Large Enrollment Course Interactive and Engaging chapter in this volume.