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Teaching economics to the masses: The effects of student help centers on academic outcomes

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ABSTRACT

Many institutions of higher education have some form of voluntary peer tutoring. There have been a number of efforts to examine the effects of such programs on student outcomes. Many of these fail to acknowledge the possibility of self-selection bias. Should such endogeneity exist, estimates regarding the extent to which help centers improve student performance will be biased. We examine the determinants of student participation in peer tutoring among students taking Principles of Economics, and we test for self-selection bias. Finally, we examine the factors that affect student performance in these classes over two semesters – approximately 1400 students. We find that students who live a greater distance from campus are less likely to participate; student ethnicity and gender also affect this choice. We also find that the number of visits to our help center is exogenous. Finally, we find that supplemental instruction significantly improves student performance.

1. Motivation

Universities have long been interested in various forms of supplemental instruction (SI) as a means of improving student performance. Supplemental instruction comprises a widely varied spectrum of activities, including regularly scheduled student-led recitation sections for which students register, voluntary tutoring sessions, and walk-in tutoring centers at which students seeking help meet one-on-one with a student tutor. This paper describes an economics help center of the latter sort; students in certain classes are eligible to meet with a peer tutor at almost any time during normal business hours. There have been a number of attempts to measure the effectiveness of SI and while the findings are diverse, in general they indicate a positive effect on student performance and/or retention. Our paper finds likewise, and quantifies the effect on both final exam grade and numeric course grade. Additionally, we consider whether a student's choice regarding how often to take advantage of SI might be endogenous. That is, if there exists an unobserved variable, e.g. diligence, that is correlated with both help center visitation and also class performance, the estimated coefficient on help center usage may be biased. Earlier strands in this literature fail to consider this fundamental statistical issue. We also benefit from having a substantially larger data set than that used in any of the previous research.

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2. Previous literature

The literature examining the effectiveness of SI is extensive and varied. While many of these (for example Cohen et al., 1982; Dineen et al., 1977; Kourea et al., 2007; and Springer et al., 2009) analyze programs designed to improve the performance of K-12 students, there are also quite a number that involve peer instruction at the undergraduate level. It is a common finding among these (Bruno et al., 2016; Fullmer, 2012; Arco-Tirado et al., 2011; Ning and Downing, (2010); Horn and Jansen, 2009; Etter et al., 2000; Miller and Packham, (1999), Worthington et al., 1997; Topping et al., 1997; and Blanc et al., 1983) that SI by peers contributes positively to student performance or retention.

None of these, however, addresses a statistical problem inherent in such data − the potential for omitted variables to cause endogeneity bias in the estimated effects. If, for example, students who are unobservably more diligent both seek more supplemental instruction and also study harder, it may cause the estimated parameter to overstate the benefits of SI. Alternatively, an omitted variable, perhaps note-taking ability, that is positively correlated with performance but negatively correlated with SI attendance would cause any benefit to be understated in the estimation.

Loviscek and Cloutier recognized this problem as early as 1997, and more recently a small number of researchers have attempted to address it. Loviscek and Cloutier (1997) and Lewis et al. (2005) treated this model as a matter of sample selection, and employed some version of the Heckman (1979) approach as a correction. Our situation, however, is not a matter of sample selection.[1] Stock et al. (2013) adopt a propensity matching approach to examine the effect of student-led recitation classes on final grades. They find that students participating in recitation sections receive course grades that are on average about 4 percentage points higher than non-participants. In addition to their use of the Heckman approach noted above, Lewis et al. (2005) employ a randomized group method. That is, students were randomly assigned to groups that were either eligible or ineligible to attend SI sessions. Although this does not entirely address the issue – students within the treatment group may still decide whether or not to actually attend – it is a step in the proper direction. Finally, while Munley et al. 2010 appropriately address the statistical issue of endogeneity and find that student participation in SI programs significantly (both in the statistical sense and in magnitude) raises grades, the validity of the instrument they use can be questioned. The researchers use whether or not the student is a collegiate athlete as their excluded instrument. Appropriate restrictions must affect the likelihood of choosing to participate in SI while being uncorrelated with student performance. Given the demands of the student athlete's schedule it is not unreasonable to suppose that being an athlete does indeed affect academic performance apart from SI participation.

3. Description of the student help center

The help center in the Economics Department began with two goals. The first was to provide an opportunity for students in Principles of Microeconomics and Principles of Macroeconomics to have access to one-on-one tutoring as class sizes increased. The second goal was to develop a training ground for graduate students (and senior-level undergraduates) who were considering a career in the classroom. While there are multiple instructors offering multiple sections of these courses, all sections use the same text, follow the same syllabus, and have the same exams. Although the homework sets that are assigned are not identical, instructors all pull assignments from a common pool of problem sets. The tutors that work in the help center are expected to work through all homework assignments and become adept at answering any potential homework problem assigned by any instructor. All students enrolled in Principles courses pay a small tutoring fee and can use the services of the help center as often as they choose.

Although the percentage of students taking advantage of the help center is well below 100 percent, the feedback from the students using the services is generally positive. Since its inception, we have slowly expanded tutoring to include the following courses: Intermediate Microeconomics, Intermediate Macroeconomics, International Trade, Economics of Discrimination, and Economics of Consumption. With more resources being devoted to this type of supplemental instruction, it is important to understand better the benefits. Although this paper focuses on the performance of students in Principles of Microeconomics and Principles of Macroeconomics, as more data is accumulated we will later be interested in analyzing the effectiveness of supplemental instruction in upper-level classes as well.

4. Data and empirical methods

4.1. Data sources

The data used in this study involve students taking Principles of Economics classes eligible to use the help center in two semesters: Spring 2012 and Spring 2013. These data were gathered from several different sources. Demographic data on students were collected from our university's institutional research office. Variables from this source provided information on student gender, race and ethnicity, SAT or ACT score, zip code of the home address, and class status (i.e., freshman, sophomore, junior, or senior standing). As noted above, we believe that one determinant of the number of help center visits is distance between each student's home and the help center. This variable was constructed by calculating the great circle distance between the coordinates of the zip + 4 of the

[1] In general, performance of students who do not elect to avail themselves of SI is known – these students are certainly part of the full sample. Furthermore, these authors do not appear to have true exclusion restrictions.

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