International Review of Economics Education xxx (xxxx) xxx–xxx

Contents lists available at ScienceDirect

International Review of Economics Education

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

Evaluating the effect of online principles courses on long-term outcomes

William Bosshardt[a,1], Eric P. Chiang[b,1,*]

[a] Department of Economics, Florida Atlantic University, Boca Raton, FL, 33431, USA
[b] Florida Atlantic University, Boca Raton, FL, 33431, USA

ARTICLE INFO

JEL classification:
A20
A22

Keywords:
Lecture capture
Online education
Long-term learning outcomes

ABSTRACT

This paper analyzes the long-term effects of the format by which students take microeconomic principles. We analyze whether an online format affects student performance in subsequent economics courses, willingness to take more economics courses, and the likelihood of majoring in economics. Our findings show that students taking microeconomic principles online performed worse on average in a subsequent macroeconomic principles course, but had no impact on the number of subsequent economics courses taken nor on the likelihood of majoring in economics. These results provide guidance to institutions considering expanding online course offerings by analyzing potential benefits and costs over time.

1. Introduction

The proliferation of online courses in institutions of higher learning has increased as a result of technologies that facilitate their implementation and the cost efficiencies they generate. It has become very common for economic principles courses to be offered in some form online, such as in distance learning, hybrid classes, or lecture capture formats.

But even as colleges and universities expand their online course options, the existence of face-to-face sections of introductory courses has generally survived, albeit in smaller numbers as administrators attempt to balance their course offerings to cater to a broader student demographic. Schools that have a larger traditional full-time student population generally offer a higher proportion of courses in face-to-face format, whereas schools that have larger proportions of students that work, attend school part-time, or fall into other non-traditional student categories tend to offer more online options. In large public institutions which have large numbers of both types of students, choosing the right number of face-to-face and online sections to best match the needs of students has become an important challenge.

As a result, many institutions offer students a choice between face-to-face and online sections in high-enrollment courses such as economic principles. Because both formats presumably cover the same material despite the different mode of delivery, schools generally do not differentiate between formats when evaluating whether a student has satisfied a graduation requirement or a prerequisite for a subsequent course. For example, a microeconomics principles course assumes the same learning outcomes regardless of whether it was taught in a live classroom or online. This paper investigates the validity of this assumption in greater depth.

Although the existing literature has compared learning outcomes (such as grade performance) and student attitudes between online and face-to-face sections in many subjects, few if any have determined whether those learning outcomes adequately prepare students for more advanced courses, and whether the format sparks long-term interest in the subject matter. In other words, does

* Corresponding author.
E-mail addresses: wbosshar@fau.edu (W. Bosshardt), chiang@fau.edu (E.P. Chiang).
[1] Department of Economics.

https://doi.org/10.1016/j.iree.2018.03.001
Received 22 May 2017; Received in revised form 26 November 2017; Accepted 3 March 2018

taking a principles course online influence one's performance in a subsequent economics course? And does the format influence one's decision to enroll in more economics courses or to major in economics?

This paper addresses these questions by analyzing a sample of 421 students taking a microeconomic principles course at a large public university with a diverse student population. We use a sample of student performance and survey data from the fall term of 2012, and follow these students through the end of the fall term of 2014. We obtain detailed transcript data from the same sample of students to examine their performance in subsequent courses, the number of future economics courses taken, and the choice of major.

Although prior studies have examined the effects of principles courses on subsequent courses, there are very limited studies that empirically estimate the long-term effects based on the format by which students take economic principles. We build upon existing studies that compare student learning outcomes between online and face-to-face formats of the course being studied. Our results provide valuable guidance to institutions of higher learning of whether expanding online course offerings could have a beneficial or detrimental effect on future student learning outcomes.

The remainder of this paper is as follows: Section 2 discusses existing studies contrasting face-to-face with online courses. Section 3 provides some background details on the lecture capture format. Section 4 presents the data. Section 5 describes the models and results. Section 6 discusses the policy implications of online learning, and Section 7 concludes.

2. Literature review

Much of the existing research on the comparative outcomes of students in online versus face-to-face courses has focused on three aspects: 1) factors that influence students to select one format over another; 2) learning outcomes between online and face-to-face students, and 3) attitudes toward online learning. Nearly all studies that compare online versus face-to-face classes look at some combination of the above for the section of the course being analyzed. In other words, the studies are static—data collected for a class are used to analyze performance and attitudes in that same class.

A summary of early studies on the effects of online learning is found in a U.S. Department of Education report prepared by Means et al. (2010). More recently, several studies have focused on the effectiveness of a specific type of online format, lecture capture, in which students watch a recorded version of a live class online in lieu of attending the class in person. Figlio et al. (2013) and Bosshardt and Chiang (2016) focused on learning outcomes between a "live" section of economic principles and a lecture capture section. A key difference between the studies is how selection was addressed. In the former, selection was controlled by randomly placing students into an "only live" and "only online" group, allowing learning outcomes based on student performance to be compared, controlling for various personal characteristics. The authors found that the live group performed modestly better than the online group, particularly for certain subgroups including Hispanic students, male students, and lower-performing students. Bosshardt and Chiang (2016) controlled for selection by estimating the factors that induce students to select one format over another. Therefore, learning outcomes measured in this study are influenced by the factors that led students to select one particular format over another. The authors find that attitudes toward online learning matter, along with expected factors such as the number of hours a student works and the distance one lives from campus.

Other recent studies focusing on lecture capture include Euzent et al. (2011) and Terry et al. (2015). Euzent et al. (2011) compared attitudes and outcomes between lecture capture and face-to-face sections taught by the same instructor, from which students were able to select the format without an effective capacity, similar to our study. The authors found no significant difference in student performance between formats, and that student perceptions of lecture capture were very positive. Terry et al. (2015) focused on the effect of lecture capture as a supplementary feature in face-to-face business courses. In their study, lecture capture was not a substitute for a face-to-face class, but rather a complement to it by allowing students to watch classes again. When used in this way, lecture capture was found to significantly improve overall performance by a margin of three percentage points on average.

Of course, prior studies have not focused exclusively on lecture capture, as a myriad of other online offerings abound including distance learning and hybrid courses. Gratton-Lavoie and Stanley (2009) studied the effect of virtual chat sessions in place of face-to-face classes, and found that students in the online sections did not perform differently than face-to-face classes after controlling for age and GPA. Joyce et al. (2015) and Olitsky and Cosgrove (2014), and Bowen et al. (2014) compared traditional and hybrid (reduced lectures with an online component) courses in economics and statistics, respectively. These studies analyzed the effect of class time on performance and whether online resources serve as an effective substitute for class lecture. Their results showed that traditional courses performed only slightly better than hybrid courses, suggesting that the cost savings to students and universities from using online and hybrid formats justifies their growing use.

Although most studies have shown no significant overall difference in performance between online and face-to-face courses, several have highlighted various exceptions. Wunder et al. (2013), for example, argued that the lack of differences in performance outcomes between online and face-to-face courses may be due to differences in how assessments are administered. Specifically, online courses tend to give open book and note assessments and fewer if any proctored assessments, and therefore are not perfect substitutes for one another. Xu and Jaggars (2013) presented evidence that students taking online classes within community and technical colleges performed significantly worse on average than those in small face-to-face classes common in these colleges. It suggests a tradeoff between online learning and small enrollment courses that is not captured in studies that focus on large enrollment courses. And finally, a loosely related study by Trost and Salehi-Isfahani (2012) suggests that the completion of online homework in and of itself does not necessary affect performance, but rather correlates with additional effort in other activities such as reading the book or taking notes. This argument could be applied for lecture capture. Offering a lecture capture option might not in and of itself affect student outcomes, but students who are motivated to invest time in an online course are likely to benefit from the advantages that online courses offer, an argument supported by Calafiore and Damianov (2011).