

Kevin Roshak
University of Houston
Bauer College of Business

Abstract

Chegg is an education technology company with a market capitalization greater than traditional textbook publishers. Its main product, *Chegg Study*, allows students to obtain homework solutions from “expert” contractors. I track the effects of Chegg over a five-year period for a large finance course of upperclassmen. I find that 25% of students—including 15% of high-scoring students—use Chegg blindly, copying obviously wrong answers. To study the causal effect of Chegg, I use variation in takedown requests for copyright violations as a quasi-experiment. These takedown requests remove answers from the website, making Chegg less tempting. I find that high-scoring students do particularly well on subsequent exams after the temptation to shirk on homework is reduced.

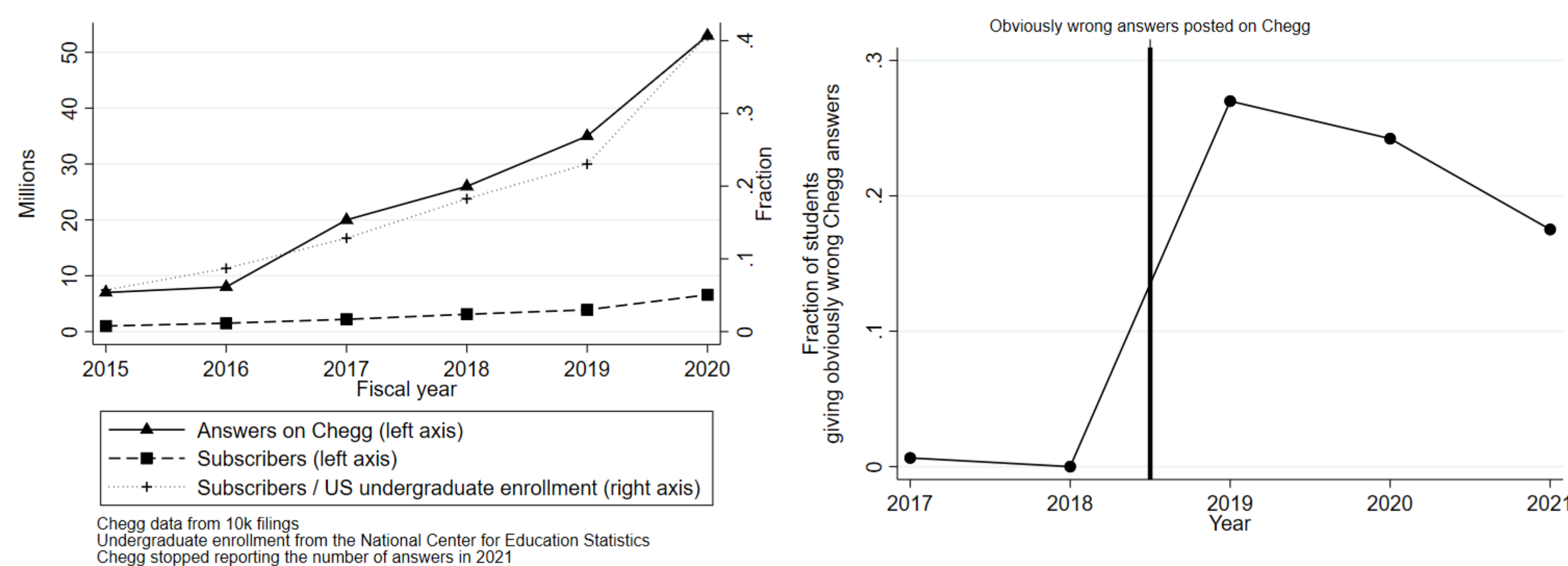
Introduction

- There is a consensus that study time is the most effective way to improve student understanding (Allgood, Walstad, and Siegfried (2015)). A typical way to increase study time is to assign homework problems.
- *Chegg Study* is a cheap product that allows students to solicit answers to homework problems from a network of experts, often in 30 minutes. Its availability therefore precludes instructors from giving meaningful weight to assignments completed outside of class, potentially harming pedagogy.
- This paper:
 - Documents the pervasiveness of Chegg use.
 - Studies the effects of countermeasures instructors can employ.
 - Estimates the effect of Chegg availability on the distribution of student understanding.

Class setting and data

- The course is required for finance majors, and was taught by the same instructor with the same material from 2017 to 2021.
- Each year had three sections with about 50 students, for a total of 782 students. The unit of observation is the student.
- Paper uses two components of the course grade:
 - Weekly quizzes comprised 10-15% of the course grade. Only the best five out of ten quizzes counted. Students can revisit quizzes as often as they like during the week. Hence, these questions often show up on Chegg.
 - Two midterms and a final exam comprised 60% of the course grade. These are given in-class and the questions do not appear on Chegg.
- **Countermeasures** were staggered:
 - Instructor systematically searched for quiz questions on Chegg, Coursehero, and other sites. When a question was found, instructor submitted a **takedown request** under the DMCA. This countermeasure was implemented after the first midterm of the 2018 semester.
 - **Parameters for quiz questions were randomized** starting with the 2020 semester.

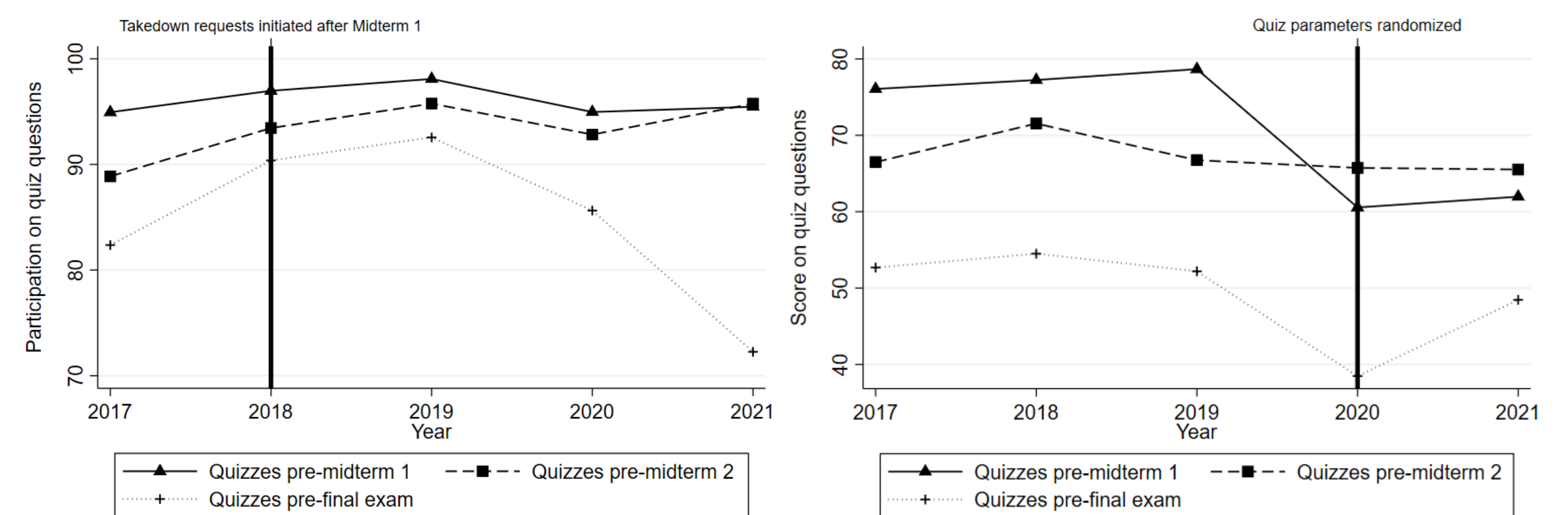
How many students use Chegg?



- Many! From Chegg’s annual statements, it had 7.8 million subscribers in 2021. This amounts to about 50% of the undergraduate population.
- Many use Chegg by blindly copying answers. When obviously incorrect answers are posted on Chegg in 2019, the number of students giving this combination of answers jumps from <1% to 25%.

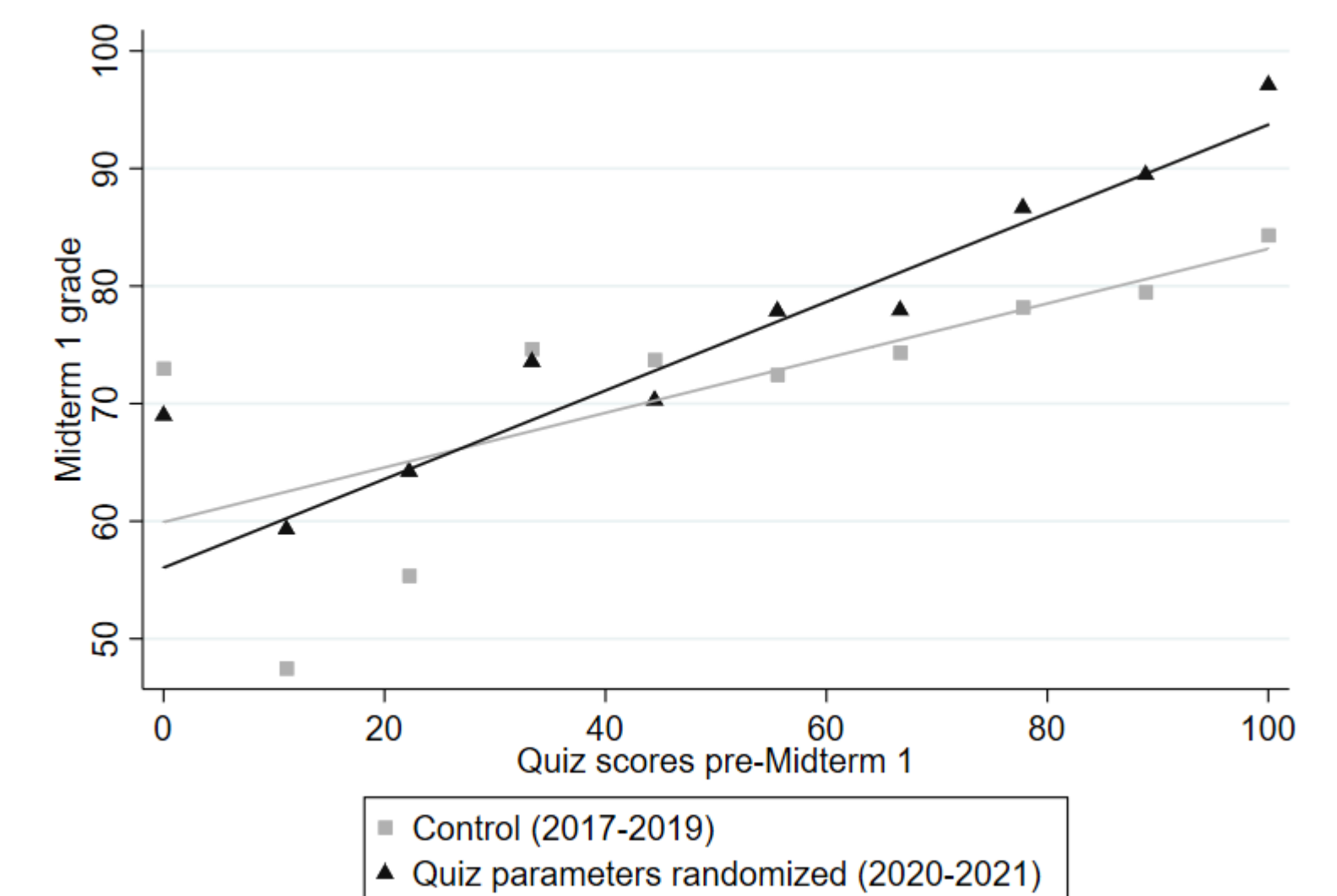
What effect do countermeasures have?

- Examine three outcomes: quiz participation, quiz scores, and the relationship between quiz scores and subsequent exam performance.



- Participation increases immediately after takedown requests are initiated. Students can observe that Chegg pages have been removed, and may infer that quizzes will be more difficult going forward. Participation goes up because students can no longer afford to waste their chances (recall that only best 5 quizzes count).
- Quiz scores do not drop when takedown requests are initiated. This is likely due to the “whack-a-mole” effect—someone else posts the questions to Chegg during the week before the quiz deadline.
- Quiz scores do drop when parameter randomization is paired with the takedown requests. Most of this drop is concentrated on introductory material. This is consistent with the large number of students who merely copy answers from Chegg blindly, and are unable to follow the calculations with new numbers.

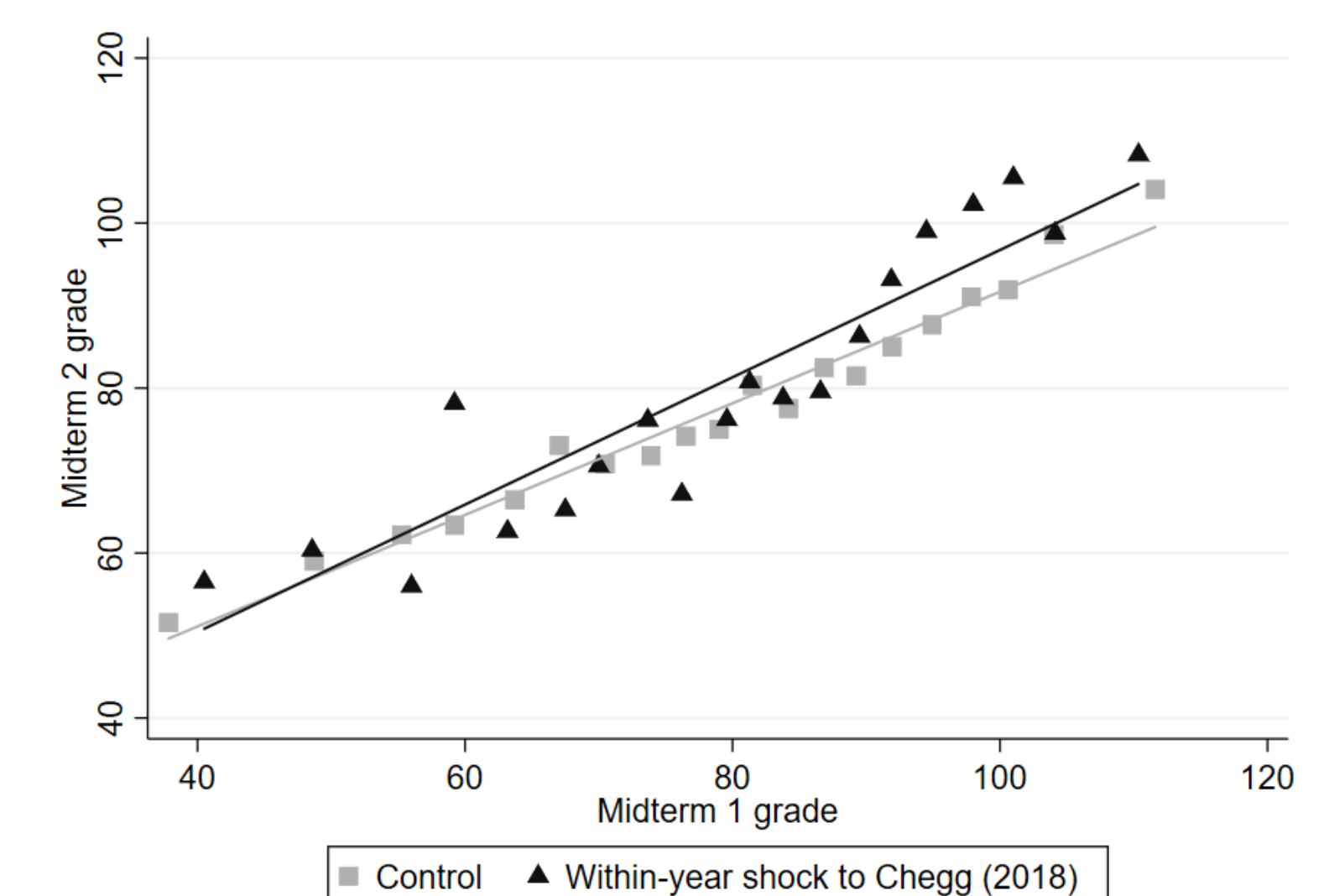
- Quiz scores better predict exam scores when parameter randomization is paired with takedown requests. The coefficient increases 50%.



How is student understanding affected?

- The data has the following limitations:
 1. Quiz scores may be impacted by student understanding or the ease of cheating on Chegg. Thus, I need to use **exam scores**.
 2. There are new students every year. This makes comparisons across years difficult. Thus, I need to use **within-year** variation in Chegg availability. The **takedown requests**, which were initiated after the first midterm of 2018, provide such an experiment.
 3. The instructor writes new tests every year. This makes the level of exam scores unusable. Thus, I use the **distribution** of exam scores.
- **Intuition for identification: if the takedown requests have heterogeneous effects on student understanding, I should see a shift in the distribution of exam grades after the first midterm of 2018** (relative other years with no within-year variation in Chegg availability).

- After takedown requests are initiated, high-scoring students do particularly well on subsequent exams.
- The autocorrelation in exam scores increases about 30%.



- There is no apparent effect on below-average students. This is consistent with theory on educational standards (e.g. Betts (1998)) and evidence on tracking (e.g. Antonovics et. al. (2022))—sharper incentives raise performance on high-performing students, and have little effect on rest.

References

1. Allgood, Walstad, & Siegfried (2015). Research on Teaching Economics to Undergraduates. *Journal of Economic Literature*, 53(2), 285-325.
2. Betts (1998). The Impact of Educational Standards on the Level and Distribution of Earnings. *American Economic Review*, 88(1), 266-75.
3. Antonovics, Black, Cullen, & Meiselman (2022). Patterns, determinants, and consequences of tracking: evidence from Texas public schools. Working paper.

Kevin Roshak
University of Houston, Department of Finance
Email: krosnak@bauer.uh.edu
Website: <https://sites.google.com/site/krosnak/>