



COSUMNES RIVER COLLEGE

OFFICE OF RESEARCH & EQUITY

Enrollment and the Cost of Textbooks

Office of Research and Equity

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Author:

Paul Meinz

Executive Summary

Background

This report was updated in Spring 2023 to reflect an analysis correction. In Fall 2021, Cosumnes River College (CRC) began providing resources for instructors to switch from traditional textbooks to free open educational resources (OER). In an attempt to support this effort, the Research and Equity Office evaluated the impact of textbook costs on enrollment. Two primary analyses were conducted. First, day-to-day enrollment data were gathered up to the start of the Spring 2022 term, and courses with the zero-textbook cost (ZTC) flag in the CRC schedule were compared to those without. Second, data gathered from the bookstore in Fall 2021 were used to test the association between precensus drops and textbook costs at the start of the fall term.

Summary of Findings

1. Courses with the ZTC flag in the Spring 2022 schedule had more enrollments by the first day of the semester (*Figure 1*; page 4). However, this difference was not statistically significant.
2. Courses with higher textbook costs in Fall 2021 had significantly more precensus drops during the first weeks of the semester – even after controlling for the prior success rate and the final enrollment of a course (*Table 1*, page 5).

Conclusions and Recommendations

High textbook costs may result in more precensus drops during the first few weeks of a class. This suggests that reducing the cost of textbooks may be one way of retaining students in a course. On the other hand, the ZTC flag in the schedule does not appear to result in more enrollment in Spring 2022 on the first day of the semester.

Caveats and Limitations

There are numerous factors that attribute to increases and decreases in enrollment. Without a strict experimental design, there is no way to completely account for all potential confounding variables. Future investigations should attempt to replicate the findings reported here.

Background and Methodology

Method

The present investigation sought to answer two primary questions regarding the association between enrollment and textbook costs: Do ZTC courses draw more enrollment than other courses, and do textbook costs result in drops prior to census? To answer the first question, day-to-day enrollment data were gathered in non-skills lab/work experience courses in Spring 2022. Courses with the ZTC flag in the CRC schedule were compared on (1) their day-over-day enrollment growth rate and (2) their overall average enrollment. Analysis focused on Spring 2022 data because substantial changes were made to the ZTC flag in the CRC schedule during the fall term.

With regards to the aforementioned analysis, instructional factors are a potential confounding factor when comparing courses with free and non-free textbooks. For example, an instructor that adopts free and/or OER materials may engage in other accommodating practices. These practices may impact enrollment – not necessarily the cost of textbooks. In order to minimize this confounding factor, data were analyzed up to the first day of classes in Spring 2022. Prior to the start of the semester, the potential confounding factor of instruction would have been less impactful, although perhaps not non-existent (e.g. many instructors engage with their students prior to the start of courses and instructor reviews are available online). To that end, only full-term and first eight-week courses were included in the analysis because these courses had the same semester start date. Additionally, because of the way enrollment data is stored in the Los Rios Peoplesoft database, only courses that had at least one enrollment at any time were included in the analysis.

With regards to the second question, the number of precensus student drops were gathered for each course in Fall 2021 from the start date of the course to the census date. Here a *precensus drop* is defined as dropping a course after the course started, but before census, and not returning to that course during the term. Analysis focused on only full-term courses because they constitute the bulk of enrollment at CRC and have the same census date. Similar to the first question, skills labs and work experience courses were excluded from the analysis. Instructional factors were again a potential confounding factor – especially because this analysis focused on precensus drops during the first few weeks of instruction. In order to account for instructional factors, the three-year average course success rate for each course was used as a control variable. Additionally, the final enrollment total (after census) for the course was entered as a control variable.

For this analysis, textbook cost data were provided by the CRC bookstore. Courses have a multitude of options – from used books to digital licenses. For the present investigation, the highest possible cost was calculated for each class along with the lowest possible cost. The “estimated” cost of textbooks was then calculated as the average of these two values (e.g. mid-way between the highest and lowest cost) to reflect the fact that not all low-cost options will be available to students (used books run out of stock, for example). It should be noted that textbook data are manually entered by instructors and then by the bookstore. As such, substantial manual cleaning of the data was required by the research team. Additionally, it’s impossible to calculate what the actual cost is for a student. For example, a student may have previously owned the textbook from another class.

Findings and Analysis

Analysis 1: Enrollment and the ZTC Textbook Flag

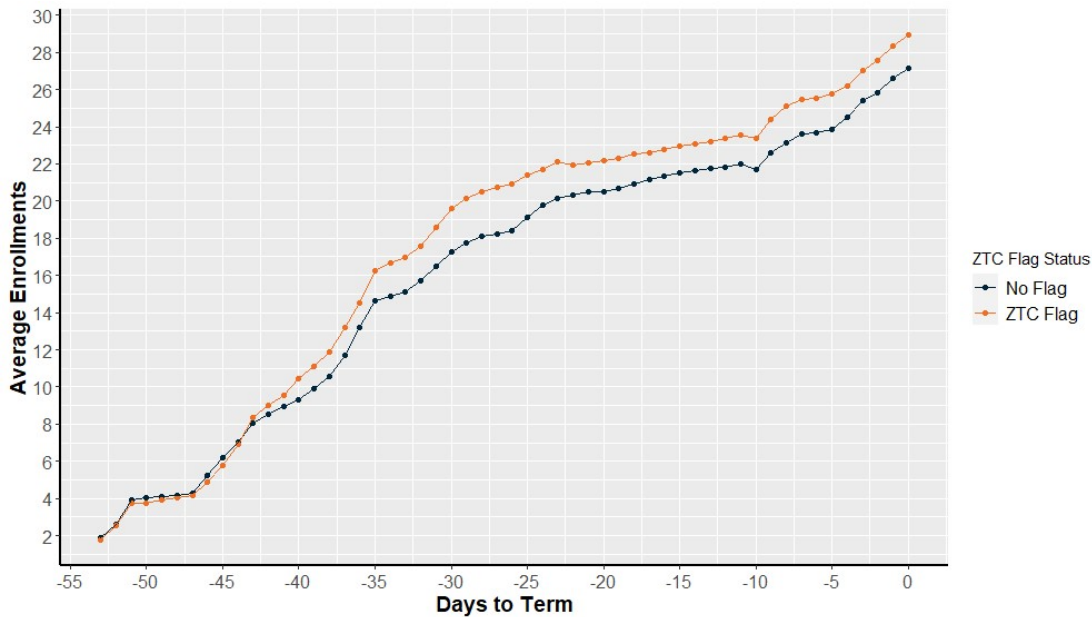
Enrollment data were gathered for 1071 courses for each day from the start of enrollment to the start of the semester. Note that, in this case, a course is different from an “enrollment section”. Courses may have multiple enrollment sections (e.g. a lecture with two labs), and in this circumstance, the combined enrollment sections were treated as one course. A total of 141 (13.2%) of these courses had a ZTC flag displayed in the spring 2022 course schedule. Each course had a maximum of 54 distinct enrollment measurements for each day leading up to the start of the term. In order to appropriately analyze these data (daily enrollments clustered within courses) a multilevel generalized linear model with a poisson error term and log-link function were applied. This type of model allows the analysis of data at multiple levels – looking at average enrollments across courses but also at increases in enrollments within courses. That is, one can check to see if ZTC courses fill at different rates from day-to-day, and one can check to see if ZTC courses ultimately have higher enrollments on average.

Visual examination of the trends in enrollment (*Figure 1* below) over time suggests that ZTC flagged courses may have had higher enrollments than non-ZTC flagged courses. Enrollment growth for ZTC courses appears to have been greater for about ten days (day -43 to day -35), the period aligning with priority 1 registration. Class cap and enrollment day (from -53, the start of enrollment, to 0, the start of the term) were entered into the analysis along with whether or not the course was flagged with the “ZTC” marker in the schedule. Expectedly, class cap and enrollment day were significant predictors of enrollment on the first day of the term ($z = 19.69, p < .001$; $z = 67.64, p < .001$, respectively). Courses with the ZTC flag did not have significantly higher enrollments ($z = 0.815, ns.$). Thus, the difference depicted in *Figure 1* was not statistically significant.

The interaction between enrollment day and the ZTC flag was then tested to see whether or not enrollments increased at different rates. This interaction was not significant, $z = -0.230, ns.$ This suggests that day-to-day increases in enrollment were largely similar for ZTC and non-ZTC groups.



Figure 1. Enrollments by day for courses with and without the ZTC flag.



Precensus Drops

Precensus drop data were gathered for 942 full-term courses in Fall 2021. As with the previous analysis, a course should be distinguished from an enrollment section. *Table 1* below presents data on the average number of precensus drops by textbook cost range. On average, full-term courses in Fall 2021 had 5.0 precensus drops. There’s a clear upward trend such that courses with higher textbook costs have higher average drops.

A logistic poisson regression was used to test the association between estimated cost of textbooks and precensus drops. First, as previously stated, prior success rate was entered as a control variable. Not surprisingly, historic success rate for the course was a strong and significant predictor of precensus drops, $z = -8.10, p < .001$. This was also true for final course enrollment, $z = 14.17, p < .001$. After controlling for success rate and enrollment, estimated cost was a significant predictor of precensus drops such that higher textbook costs predicted higher precensus drops, $z = 7.12, p < .001$.

The association between estimated cost and precensus drops is depicted in *Figure 2* below. Note that data points were jittered by +/- 0.5 on the x and y axis. The trendline depicts the bivariate association between estimated cost and precensus drops – not the association after controlling for success/enrollment, which is harder to depict in a two-dimensional plot. Visual inspection of this plot suggests that there may be several outliers impacting the trendline. A follow-up analysis replicated the aforementioned findings with outliers removed (*Figure 3, page 6*).



Table 1. Precensus drops by cost range

Cost Range	Count	Avg. Drops
\$0	316	4.3
0.01\$ - \$50	126	4.6
\$50.01 - \$100	254	5.3
\$100.01 - \$150	152	5.9
>\$150	94	6.0
Total	942	5.0

Figure 2. Association between estimated cost and precensus drops.

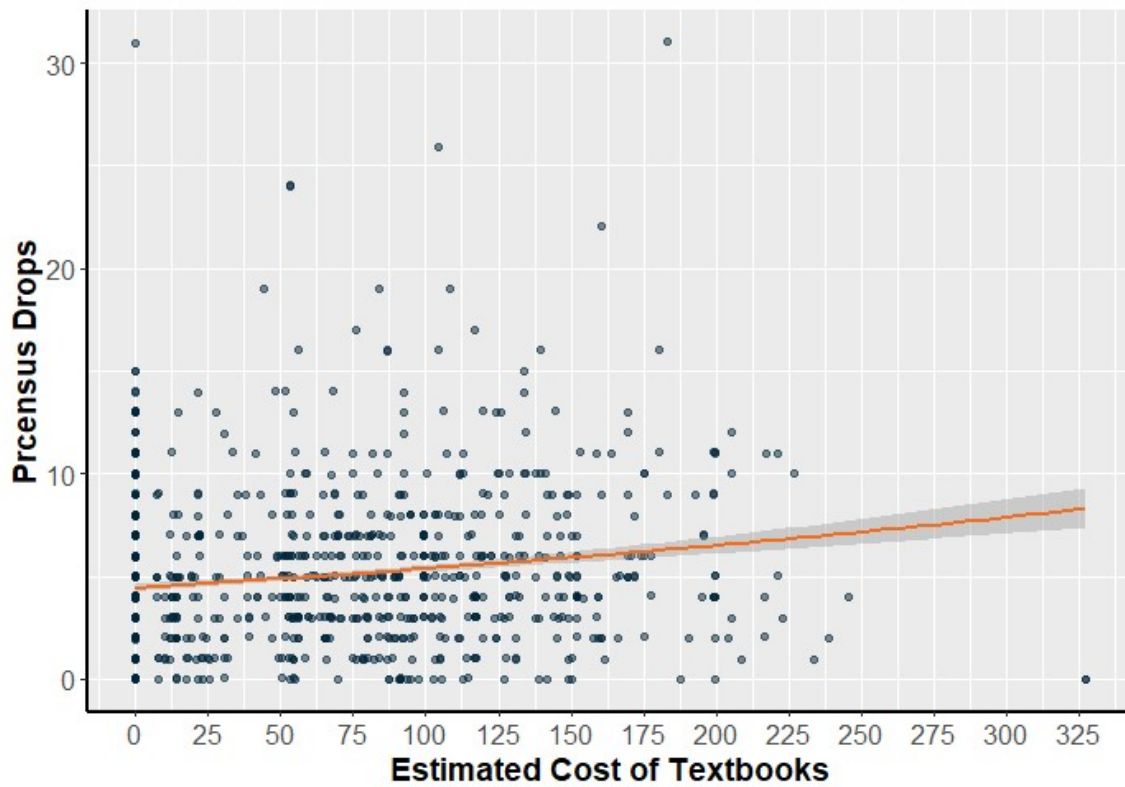
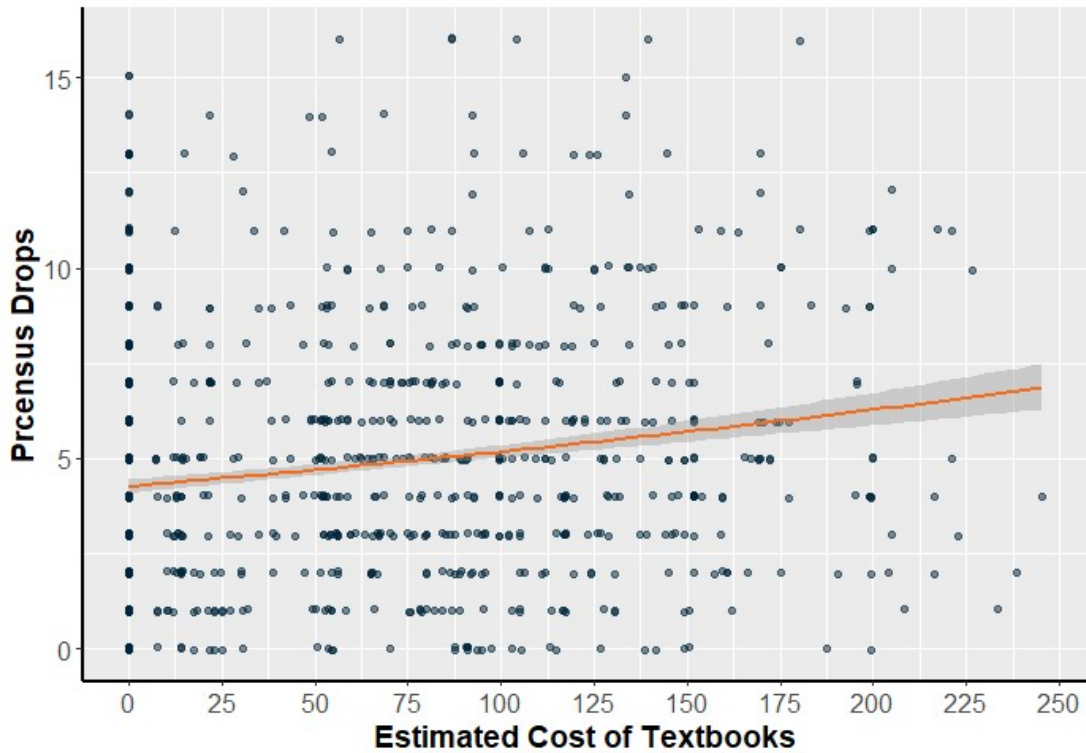




Figure 3. Association between estimated cost and precensus drops, outliers removed.



Conclusions and Recommendations

The analyses presented here suggest that high textbook costs may result in more precensus drops during the first few weeks of a class. On the other hand, courses with the “ZTC” flag in the CRC schedule did not have significantly more enrollments in Spring 2022.