

The Impact of In-Class Time on the Academic Performance in the Introductory Finance Course

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Abstract

We evaluate the impact of in-class time on the academic performance of business students enrolled in an introductory finance course. Contrary to our expectations, we observe a significant increase in the students' academic performance when in-class time is reduced (as measured on a pre-test post-test basis). When we partitioned our sample by major, we find an increase in academic performance is significant for students majoring in finance or accounting. We also find evidence that the degree of measured change in academic performance is driven by the student's academic performance in the pre-core courses (e.g., accounting, economics, math, statistics etc.).

I. Introduction

Many in academia are concerned with the assessment of academic performance and there is a plethora of research that has investigated the factors that influence performance. With respect to an introductory finance course for business majors, researchers have analyzed the relationship between academic performance and major [Sen, Joyce, Farrell, and Toutant, 1997], class attendance [Chan, Shum, and Wright, 1997], effort [Rich, 2006], GPA [Didia and Hasnat, 1998;], ACT/SAT scores [Didia and Hasnat, 1998;], prerequisites [Didia and Hasnat, 1998, Terry, 2002, Grover, Heck, and Heck, 2010], and student and faculty gender [Henebry and Diamond, 1998].

Despite the abundance of research on the factors influencing student performance, the impact of in-class hours has not been thoroughly evaluated. When presented with a unique opportunity to evaluate a significant change of in-class time, we were able to evaluate the impact of in-class time on performance, while controlling for the factors that have been found in the literature to have an influence performance.

Our expectation is that an increase of in-class time would result in a higher level of academic performance. More in-class time provides the instructor with more time for in-depth presentations and discussions of course content and problem solving exercises. Similarly, our expectation is that a reduction of in-class time would reduce the depth of the material presented and class discussions, while reducing the time available for problem solving exercises. As a result, academic performance would decrease.

Our study analyzes the performance of business students in the required introductory finance course of a program that reduced the in-class time of that course. This study contributes to the existing body of knowledge on student performance by evaluating a performance variable that has not been looked at before; in-class time. We add precision to our analysis by measuring performance using pre-and post-test methodology rather than by course grade. Contrary to our expectations, we find that students in the reduced in-class hour version of the course did not suffer a reduction in academic performance. Further, we find that accounting and finance majors achieved a significantly higher level of academic performance.

II. Background

We teach at a public university with an enrollment of approximately 12,000 undergraduate and graduate students. The College of Business has approximately 1,800 undergraduate students. The Bachelor of Business Administration program is comprised of pre-core, core, and major course work. Students complete the pre-core course work as a prerequisite to being admitted to the College. The pre-core consists of course work in mathematics, statistics, economics, and accounting. After being admitted to the College, all students are required to complete the core course work and course work in their chosen major.

In fall of 2005, the College of Business began the staged implementation of approved changes to the core of the BBA program. The changes to the core were the result of a year-long study by the College's Undergraduate Curriculum Committee and part of the Committee's regular, periodic review and assessment of the BBA program. The faculty approved a reduction in the number of credits for each core course from three credits to two credits. For our program, this meant that the in-class time was reduced from 42 hours to 28 hours per core course. The reduction of credit value and class time conserved resources and allowed student credit hours to be moved from business core classes to major and elective classes.

III. Data and Methodology

We design a pre-and post-testing instrument within the context of the topical coverage approved by the finance faculty and the learning objectives set forth for each topic. We used a pre/post-test methodology as opposed to course exam scores or grades because we are interested in the incremental, as opposed to the absolute, level of academic performance. Business students enter the introductory course with some basic financial information from the pre-core courses. For example, our required math courses provide elementary time value of money analysis and the required accounting provides basic financial information on financial statements and ratio analysis. In addition, some students may be repeating the course or transfer students may have taken a similar course at a previous institution. In such situations, exam scores or grades would be biased estimates of what the student learned in the course.

Topical coverage for the course consists of the first seven topical areas identified in a survey by Cooley and Heck (1996). The pre-test consists of 36 multiple choice questions from the Test Bank that accompanies the textbook used in the course, Brigham and Houston, *Fundamentals of Financial Management*. Each question is matched to a specific learning objective set forth by the finance faculty and approved by the college's Undergraduate Committee. We conducted a pilot study during the fall of 2005 using a draft of the exam instrument with one section of Essentials of Business Finance.

Similar to the studies that we cite in our results section, our sample is obtain from our classes at our university. In the spring of 2006, the 36-question pre-test was administered during the first day of class in two sections of the three-credit introductory finance course. Incentive for students to do their best on the pre-test was provided by awarding one bonus point for each correct answer on the pre-test. The 36 potential bonus points represent 9.6% of the total points in the course. During the semester, students were required to take three tests, which accounted

for 80% of their course grade. Each of the three tests included a different set of 12 questions from the 36-question pre-test given the first day of class. The same process for the same exams was followed for the three-credit course taught during the summer of 2006.

The two-credit course for introductory finance was first offered during the fall of 2006. The difference of 14 hours of class time required that changes had to be made in how class time was used. Although the topical coverage in the two-credit course was the same as in the three-credit course the depth of coverage was significantly less. The same 36-question pre-test was administered on the first day of class followed by and the same subsequent tests during the term in a same manner as in the three-credit course.

We represent the number of correct answers out of the 36 questions on the pre-test as the variable **PRETEST**. We sum the number of correct answers from each set of 12 questions included in the three exams to create the variable denoted as **POSTTEST**. Our primary performance measure is calculated by subtracting each student's value for **PRETEST** from their corresponding value for **POSTTEST**. We use the variable **DIFF** to symbolize this difference. That is, positive values for our variable **DIFF** proxy for the increase in knowledge that the student gained from the course.

For each student in both the three-and two-credit versions of the course, we obtained data on gender (**GENDER** is equal to 1 if student is female, 0 if male), age, and major. Gender is of interest because there is a perception that males do better than females in quantitative courses [Henebry and Diamond, 1998]. Age of student, **AGE**, is of interest as a proxy for maturity of the student and has been found to be of marginal significance in the prediction of performance [Didia and Hasnat, 1998]. Prior research has indicated that the major of the student, a possible proxy for student motivation, may impact student performance [Chan, et al., 1997; Sen et al., 1997; Henebry and Diamond, 1998]. Students taking a course in their major or closely related to their major may be more motivated to perform better. Therefore, our expectation is that accounting and finance majors will have higher level of academic performance than other business majors. The variable **MAJOR** has a value of 1 if major is accounting or finance and 0 if the student's major is not accounting or finance.

We also obtained the grades each student earned in the pre-core courses in macro and micro economics, statistics, math, and accounting as an indicator of student prior performance. The letter grades in the pre-core courses were converted to a weighted average numerical grade point average based on a four point scale, which we represent as the variable **PCGPA**. Finally, we included the variable **TRANSFER** to indicate if the student transferred into the University (0 = did not transfer in to University, 1 = transferred in). The transfer status of the student is included because there may be a perception that transfer students are not prepared adequately for the finance course if their prior course work in economics, statistics, and accounting was not from the current institution. Transfer students would have taken some, if not all, of the pre-core courses at another institution.

The initial sample consisted of the 223 students who were taking the course for the first time and attended the first class session: 89 in the three-credit version and 134 in the two-credit version. All of these students took the pre-test. Nine of the 89 students in the three-credit course

dropped the course prior to taking the first exam. Seven of the nine students did not attend class after the first class period and the other two students attended a number of classes, but dropped prior to the first exam. Twenty-seven of the 134 students in the two-credit course dropped the course. Of these 27 students, 14 did not attend class after the first class period, eight attended class but never took the first exam, and five dropped after taking the first exam. Eight students completed the three-credit course and 107 completed the two credit course for a final sample of 187 students. We use this sample to test our primary hypothesis, which is whether in-class time affects performance. Specifically, our null hypothesis is:

$$H_0: \mathbf{DIFF}_{3\text{-credit}} = \mathbf{DIFF}_{2\text{-credit}}$$

IV. Results

In Table I, we present the summary statistics on the data portioned by credit value, gender, transfer status, and major. As indicated in Panel A of Table I, we find no significant differences between the three-credit and two-credit samples for the mean values for our proxies for maturity and understanding of prerequisite material; (e.g. **AGE** and **PCGPA**). We also find that the number correct on the pre-test is not statistically different between the three-credit and two-credit samples (i.e., **PRETEST**). From the perspectives of maturity and prior performance, the samples are similar. Therefore, we conclude that the samples are from the same population and our analysis of performance during the term is justified.

Contrary to expectations, we also report in Panel A of Table I, that the difference between the post-test and pre-test, **DIFF**, is positive and significant at the 1% level. Given our finding of no significant difference in the pretest scores between the three-credit and the two-credit course, we have evidence that student performance in the two-credit course was better than in the three-credit course. Therefore, we conclude that student performance was not adversely affected by the reduction of in-class time; however, we also investigate the impact of other factors on performance.

In Panels B, C, D of Table I we present sample data and t-tests of mean differences based on student gender, transfer status, and major, respectively. From Panels B and C, we find no overall gender or transfer bias in our sample. We found that females performed significantly better than males (at the 5% level of significance) in the pre-core courses as measured by the variable **PCGPA**, but in all other respects, there are no significant differences in the sample. In Panel D of Table I, we find that the accounting and finance majors are of similar age as non-accounting and non-finance majors and performed similarly on the Pre-Test. However, we do find that the accounting/finance majors have a significantly greater **PCGPA**. Our primary finding in Panel D of Table I is that the accounting/finance majors performed significantly better (as measured by **DIFF**), which leads us to investigate whether there are differences in the performance of accounting and finance majors in the two-credit versus three-credit course.

In Panels E and Panel F of Table I, we report that in both the two- and three- credit courses, accounting/ finance majors have significantly greater understanding of the prerequisite course material and that their performance (as measured by **DIFF**) is significantly higher than that of the non-accounting/non-finance majors. Although not presented in our Tables, we find that there are no statistically significant differences between accounting/finance majors in the two-credit

versus three-credit course nor between non-accounting/non-finance major in the two-credit versus three-credit course for of the key variables (i.e., **AGE**, **PCGPA**, **PRETEST**) at the 5% level of significance. We also observe that regardless of major, academic performance (**DIFF**) was greater in the two-credit course. This difference in academic performance was significant for accounting/finance majors, but not for non-accounting/finance majors

Table I**Test of differences in mean values of key variables:****Categorized by course credit value, gender transfer status and major**

Panel A: Mean values of key variables for 187 student sample by course credit value

Variable ^a	3-credit course n=80	2-credit course n=107	t-statistic for difference in mean values	p-value associated with t-statistic
AGE	22.08	21.77	0.62	0.5381
PCGPA	2.95	3.04	-1.16	0.2464
PRETEST	10.03	9.43	1.34	0.1811
DIFF	8.53	10.80	-3.19	0.0017

Panel B: Mean values of key variables for 187 student sample by course credit value by gender

Variable ^a	Male students n=100	Female students n=87	t-statistic for difference in mean values	p-value associated with t-statistic
AGE	22.19	21.57	1.28	0.2012
PCGPA	2.91	3.11	-2.53	0.0139
PRETEST	9.64	9.74	-0.22	0.8263
DIFF	9.71	9.98	-0.36	0.7207

Panel C: Mean values of key variables for 187 student sample by transfer status

Variable ^a	Non-transfer student n=163	Transfer student n=24	t-statistic for difference in mean values	p-value associated with t-statistic
AGE	21.79	22.71	-1.29	0.1985
PCGPA	3.01	2.94	0.78	0.4406
PRETEST	9.85	8.58	1.94	0.0543
DIFF	9.66	11.00	-1.21	0.2289

Panel D: Mean values of key variables for 187 student sample by major

Variable ^a	Non-accounting and non-finance Major n=72	Accounting and Finance Major n=115	t-statistic for difference in mean values	p-value associated with t-statistic
AGE	21.90	21.90	0.00	0.9976
PCGPA	3.25	2.85	-5.26	<0.0001
PRETEST	9.31	9.92	1.37	0.1732
DIFF	12.58	8.11	-6.48	<0.0001

VARIABLES: AGE = Age of student, PCGPA = Pre-Core Grade Point Average; PRETEST = Score on the pre-test; POSTTEST = Sum of TEST1, TEST2, and TEST3; DIFF = POSTTEST – PRETEST.

Table I (continued)

Test of differences in mean values of key variables:

Categorized by course credit value, gender transfer status and major

Panel E: Mean values of key variables for 80 students in the three-credit course sample by major

Variable	Non-accounting and non-finance Major n=26	Accounting and Finance Major n=54	t-statistic for difference in mean values	p-value associated with t-statistic
AGE	23.04	21.60	-1.63	0.1072
PCGPA	3.14	2.86	-2.57	0.0121
PRETEST	9.73	10.17	0.63	0.5297
DIFF	10.69	7.50	-3.27	0.0016

Panel F: Mean values of key variables for 107 students in the two-credit course sample by major

Variable	Non-accounting and non-finance Major n=46	Accounting and Finance Major n=61	t-statistic for difference in mean values	p-value associated with t-statistic
AGE	21.26	22.16	1.59	0.1146
PCGPA	3.29	2.85	-4.34	<0.0001
PRETEST	9.07	9.70	1.06	0.2903
DIFF	13.65	8.66	-5.23	<0.0001

VARIABLES: AGE = Age of student, PCGPA = Pre-Core Grade Point Average; PRETEST = Score on the pre-test; POSTTEST = Sum of TEST1, TEST2, and TEST3; DIFF = POSTTEST – PRETEST.

In Table II we present the results from two OLS regression models which use our performance measure, **DIFF**, as the dependent variable. Model 1 contains the four variables cited in the literature that influence academic performance (i.e., **GENDER**, **TRANSFER**, **MAJOR**, and **PCGPA**). Our results indicate that the coefficient for **MAJOR** is significant at the 1% level and with the anticipated sign; thereby, indicating that the proxy for motivation for the accounting and finance majors is significantly higher than non-accounting or non-finance majors. The proxy for prior understanding of prerequisite material, **PCGPA**, is also positive and significant at the 1% level and consistent with Borde *et al.* (1998) and Grover *et al.* (2010). That is, we find that better student performance in prerequisites classes is directly related to higher performance in our introductory finance class.

Table II
OLS Regression estimates of models with dependent variable
of the difference between the post-test score and the pre-test score
(p-value of coefficients in parentheses)

VARIABLE	MODEL 1	MODEL 2
INTERCEPT	-1.426 (0.5129)	-1.932 (0.3732)
GENDER	-0.359 (0.5785)	-0.228 (0.7225)
TRANSFER	1.655 (0.0775)	1.000 (0.3033)
MAJOR	0.478 (0.0019)	0.456 0.0027
PCGPA	4.359 (<0.0001)	4.229 (<0.0001)
CREDITS		1.457 (0.0289)
R-SQUARE	0.3100	0.3280
F-VALUE	20.44 (<0.0001)	17.67 (<0.0001)

VARIABLES: DIFF = POSTTEST – PRETEST; POSTTEST = Sum of TEST1, TEST2, and TEST3 AND PRETEST = Score on the pre-test; CREDITS = credit value of course, 3 credit=0, 2 credit=1; GENDER = Gender of student, Male=0, Female=1; TRANSFER = did student transfer into program, no=0, yes=1; MAJOR = Major of student, Non-Accounting or Finance = 0, Accounting or Finance major = 1; PCGPA = Pre-Core Grade Point Average.

Similar to Didia and Hasnat, (1998) and Grover *et al.* (2010), we find that GENDER and TRANSFER are not significant in explaining performance; however, our results do differ from the findings of Sen *et al.* (1997). Contrary to Borde, Byrd, and Modani (1998) our findings indicate that transfer students are not disadvantaged with respect to the reduction of in-class time by taking pre-core classes elsewhere.

In Table II we present the results for our primary model, Model 2. In this model we include the same four independent variables from Model 1 and add the dummy variable, **CREDIT**, to distinguish between the three-credit and the two-credit course; i.e., in-class time. **CREDIT** is equal to 1 if the student is from a two-credit course and zero otherwise. For Model 2 we find that **CREDIT**, **MAJOR**, and **PCGPA**, are all significant at the 5% level. As with the results reported in Table I, we did not expect to find that the sign on the dummy variable for reduced class time to be directly related to performance. That is, we find that academic performance significantly improved in the two-credit course compared to the three-credit course even when we controlled for gender, transfer status, motivation and understanding of prerequisite material. Therefore, a reduction of in-class time did not lead to a lower degree of academic performance, but actually improved performance.

V. Summary

Our analysis investigates the impact of changing the number of in-class hours on academic performance. We were presented with a unique opportunity to evaluate the impact of reducing the in-class hours by one-third (from 42 hours to 28 hours). We were able to examine the impact of this significant decline of in-class hours on academic performance while controlling for student gender, transfer status, major, and GPA in pre-core classes. Based on a sample of 187 students, simple tests of mean differences across student characteristics indicated that student performance in a two-credit, course was significantly higher than performance in a three-credit course. Although our results may be unique to our university, our OLS regressions confirmed that our primary results were not driven by gender or by transfer status. However, we did find evidence that student's prior academic performance in prerequisite courses and student's major was related to performance.

Although we found that the academic performance of non-accounting or non-finance students improved in the two-credit course relative to the three-credit course, the difference was not statistically significantly higher. We did find that accounting and finance students performed significantly better in the two-credit class than in the three-credit class, but accounting and finance students also had a greater pre-core GPA. Therefore, student motivation to perform, as proxied by major, and past performance, play an important role in academic performance. Our results confirm previous research that stressed the importance of student preparation in the prerequisite courses. Students who are more adequately prepared for the finance course are better able to adjust to changes to the traditional course delivery format. Our results also indicate that students with lower academic performance in prerequisite courses may have lower academic performance with changes to the traditional format. In-class time and the corresponding class interaction may be very important to the academic performance for these students. Business programs that alter the in-class time or format of the introductory finance class via technology may want to stress the importance of the pre-requisite courses.

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