

Early Morning Classes and Finance Student Performance

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ABSTRACT

We test a series of hypotheses, where proprietary data helps to describe student performance in early morning introductory finance classes. Demographic, behavioral and educational dogma are employed in helping to explain student performance at varying class times, as a function of such factors as work schedules and sleeping habits. We find that student performance is enhanced with more adequate sleep, in classes starting later than 8:00 AM, for students who do not work, who are taking fewer hours, and for students who complete their undergraduate studies at a single school. We find older students doing better, and we discover that our findings are largely robust. Our findings are important to student, educator, counselor and administrator. Results may help to describe the often disparate performance of early-morning students, and might assist the faculty member in anticipating student or overall-class needs.

INTRODUCTION

There are a number of studies in the behavioral and education literature that consider varied exogenous and endogenous factors that contribute to student performance in college classes in general and the economics and finance classrooms in particular. We extend those studies with our consideration of student performance in the early morning introductory finance classroom, as that performance relates to a student's perception of the adequacy of his or her sleep. This perception is particularly meaningful in the context of early morning classes, into which a great many students are "forced" due to the unavailability of classes at other times, or the students' duties outside the classroom.

Student performance varies across a multitude of factors – a given faculty member might attribute varying grades to the student's age, his or her marital status, academic major, or extracurricular responsibilities and activities. However, while each of these and other factors might anecdotally be an attractive "excuse" for a student's classroom performance or attendance, no circulating study considers the performance of finance students relative to these factors and the time of a class' offering.

This research concerns itself with varying student performance as a result of attendance at early morning classes, and as a function of several other control variables. With constrained university budgets, and limited physical plant at most colleges, the 8:00 morning classes are a ubiquitous necessity, but what of the performance of students in these classes, especially in light of many students working in the evenings and many suffering from self-professed inadequate sleep? Each of these issues (work, sleep, early morning classes) could contribute to classroom outcomes, but the nature of the contribution is not clear.

While arguments can easily be forwarded that classes beginning at 8:00 AM provide an appropriate time to "educate," the recurring vacancies of business schools at other times in the day (or on weekends or in the evenings), and the underperformance of students in the earliest

classes may begin to evacuate the support for those arguments. We consider student performance in the early morning classes, as well as the importance of student perceptions of sleep adequacy in describing academic outcomes.

Our findings are largely consistent with our expectations, though the significance and robustness of our findings may vary. We find that students perform more poorly when they report inadequate sleep, that students in the 8:00 classes – overall – under-perform, that working students and transfer students and those taking more classes typically have lower grades in introductory finance, and that older students typically perform better. We find that the 8:00 findings are uniformly robust. None of these findings is particularly surprising, but each is reported in a manner not currently circulating in the literature, and interactive tests and planned extensions have provided and promise to provide a number of meaningful results. Our findings are important to student, educator, counselor and administrator. Prior studies are extended towards explaining differential student performance at varying class times; results might encourage greater educator willingness to cater to student desires for more expanded course scheduling, absent the pattern of many students being “forced” into morning classes, where performance often suffers.

We consider the academic research along these lines in the next section. We describe our data collection. We then conduct a traditional cross-sectional study of the explanatory factors – employing both standard OLS and PROBIT models - seeking to discover the importance of classroom timing and sleep inadequacy in describing introductory finance class grades. We report our results, suggest and conduct a series of tests for robustness, and examine the implications of our findings for various stakeholders. We conclude the paper with a summary and a set of encouragements for subsequent research.

BACKGROUND

A broad literature examines student performance within and outside business schools; authors consider a multitude of factors correlated with learning, and grades, for students in the finance classroom and across campus. Business, educational, behavioral, and other health-related journals seek to reveal the most significant variables associated with student success. Each documents the evolution of the understanding of how one student’s success might have been anticipated or another’s frustration avoided.

In some of the earlier, and more prosaic, research, Clauretje and Johnson (1975) find that the student closer to graduation, with a higher GPA, who is male and an economics major, performs better than his peer in an introductory economics class. Anderson, Benjamin and Fuss (1994) extend that work and affirm the importance of a student’s quantitative background in predicting success in an introductory econ class and also reveal the underperformance of women in that discipline. Henebry and Diamond (1998) take the gender issue a step farther, and find lower withdrawal rates and higher overall student grades in a managerial finance class where the *professor* is a female. Ballard and Johnson (2004) echo the earlier Anderson, et al findings with an affirmation of the importance of a “basic understating of algebra” in mastering the first classes in economics.

Augmenting earlier work, Newman-Ford (2008) affirms the importance of class attendance, finding a statistically significant correlation “between ... attendance and academic attainment.” Newman-Ford’s and Ballard and Johnson’s (2004) findings are anticipated, in a way, by Durden and Ellis (1995); their data imply that attendance and the prior study of calculus are positively

correlated with economics course outcomes. Chan, Shum and Wright (1997) also find that attendance is important, but that the relationship is not so strong that professors should “mandate that students regularly attend” class.

Examining finance student performance alone, Filbeck and Smith (1996) extend Holley and Jenkins (1993) and find that student performance on the exams in a corporate finance class is significantly correlated with the four descriptive factors in the Myers- Briggs personality profile. Henebry (1997) and Wilson (2002) underscore the still-evolving nature of research into the factors influencing introductory finance student performance, the former finding improved student performance in shorter, thrice-weekly classes, the latter finding the better performance in less frequent and nighttime classes.

Many of the foundations of the examinations of student performance in finance and economics classes focus upon sundry factors not associated with class schedules or student sleep; gender, math backgrounds, absenteeism and college major have each been considered by varied authors. The importance of sleep, and class schedule, have been discussed by a different, and varied, group of authors. Trockel and Barnes (2000) confirm that sleep habits influence academic performance; they find that early risers have higher GPA's; Preidt (2009) conversely affirms that “college night owls have lower grades.” Kelly, Kelly and Clanton (2001) find that “long sleepers will perform better in school.” Brown, Buboltz and Soper (2006) extend Brown, Soper and Buboltz (2001) and underscore the negative impacts of inadequate sleep on classroom performance, offering guidelines to the university and the student on tempering these outcomes. This echoes work by Jensen (2003) who attributes a significant portion of college student dissatisfaction to inadequate sleep and poor sleep habits, findings earlier underscored by Hicks (2001a, 2001b) who shows that college student sleep times have actually fallen by over an hour since the early 1970's, likely attributable to additional extra-curricular activities. Pilcher and Huffcut (1996) note that even “partial sleep deprivation” can have a dramatic impact on student moods, as well as “cognitive and motor performance.” Machado, Varella and Andrade (1998) illustrate the impact that work schedules can have on “groups of female college students,” with stable sleep cycles noted (unsurprisingly) for students not working in the evenings, and evening workers “catching up” on their sleep on the weekends.

The broad under-performance of students in early morning classes is implied by these studies, but in none of them is the student's perception of their own sleep inadequacy singled out as an explanatory factor in describing poorer grades, in the introductory finance course or any other class. Students broadly disfavor the early morning classes, and Muller (2005) and Morgan (1996) note the reduction in university offerings of 8:00 classes and more Saturday classes in response to student aversions to earlier classes during the week. However, and this is noteworthy, some of the most responsible and, frankly, satisfied, students populate the earlier morning classes. While comments along this line are largely anecdotal, and pertain just to the finance classes observed in this study, 8:00 attendance is typically better, and student perceptions of the teacher's performance higher than with the 9:30 classes.

RESEARCH QUESTIONS

An experienced finance faculty member can quickly recall students with continuing work, family or other personal issues that contributed to poor performance in the class. In this light, the underperformance that can be explained by the perceptions of sleep deprivation, adjacent to the 8:00 schedule, is noteworthy, and we gather data to begin to answer the research that follow:

What exactly is the significance of a students overall work, study and sleep habits in describing finance class grades?

Given regular student aversion to early morning classes, as well, what role might be played by the earliest morning classes, alone, in explaining introductory finance student grades?

We were curious about these issues, and prepared this study to consider these and related factors that might both help to describe the student’s performance in the finance class, and to assist the finance instructor in anticipating particular classroom needs.

DATA

From the spring of 2006 through the fall of 2007, 310 principles of corporate finance students over four semesters at the University of North Carolina Wilmington participated in a voluntary survey that collected information on each respondent’s work and sleep behavior. After removing incomplete surveys, a maximum of 297 usable observations make up our sample. Variable names, definitions, and descriptive statistics are reported in Table 1.

Variable Name	Definition	Sum or Average
GRADE	Grade points earned in Fin 335	2.97
GPA	Grade point average at the time of taking FIN 335.	3.19
TRANS	Transfer hours earned at the time of taking FIN 335.	23.1
INST	Institutional hours earned at the time of taking FIN 335.	61.5
TOTAL	Total hours earned at the time of taking FIN 335.	84.6
TAKE	Credit hours taken during the semester in which Fin 335 was taken.	15
FIN	Student majoring in finance.	87 (sum)
WORK	Whether or not a student works for pay.	248 (sum)
NIGHT	Whether or not a student works some hours for pay during the nighttime.	146 (sum)
HOURSW	Number of hours worked.	18.5
SLEEP	Average number of hours of sleep.	6.5
SLEEPP	Preferred number of hours of sleep.	8.4
DEPRIVE	Difference between SLEEP and SLEEPP	1.9
CLASS8	Class taken at 8 a.m.	193 (sum)
S6	Number of students enrolled in the Spring '06.	48 (sum)
F6	Number of students enrolled in the Fall '06.	93 (sum)
S7	Number of students enrolled in the Spring '07.	53 (sum)
F7	Number of students enrolled in the Fall '07.	103 (sum)

In the survey, students were asked to provide information on hours worked, whether or not

they worked during the nighttime, how many average hours of sleep achieved on a nightly basis, and how many hours they would prefer to sleep on a nightly basis. These data were matched with data from student records on GPA, the total number of collegiate credit hours earned, the number of transfer hours a student had earned, and the numbers of hours taken during the semester in which they took the corporate finance course. To complete the data set, the instructor provided the grade earned in the corporate finance course, the time period in which the class was taken (either 8:00 a.m. or 9:30 a.m.), and the semester in which the course was taken.

The average grade assigned in the course (GRADE) was a 'B'. At the time of taking finance, the average student grade point average (GPA) was nearly 3.2, students on average had transferred 23 hours of credit from other institutions (TRANSFER), they had earned almost 62 hours of credit from UNCW (INST), and they were currently typically taking 15 semester hours (TOTAL). Twenty-nine percent of respondents had previously determined that finance was their desired course of study (FIN), and 84 percent worked for pay (WORK) with half of the respondents working hours at night (NIGHT). Curious about the power of these aforementioned factors in explaining course performance, we gathered data on each.

We gathered more detailed information on sleep habits and expectations, the unexamined premise being that finance class outcomes would be in part described by this factor. Towards this end, we found that students reported average nightly sleep hours (SLEEP) equal to around 6.5 while reported preferred sleep hours (SLEPP) were around 8.4 hours per night. In other words, students experience sleep deprivation (DEPRIVE) of almost 2 hours per night. Around two-thirds of the students took the finance course at 8:00 a.m. (CLASS8) while one-third took the course at 9:30 a.m. For one or two semesters the 9:30 section of the introductory class was not offered, while the 8:00 sections in the course were provided every semester. Around one third of the students took the course during the spring semesters while two-thirds took the course in the fall semesters; two sections were offered in the fall, while only one was offered in the spring.

It is important to note that the instructor was the same for each section surveyed. There should be minimal differences in instructor intangibles over the semesters.

MODEL

In order to examine the factors that influence the grade earned in introductory finance, we estimate the following equation using first an OLS specification:

$$GRADE_i = \beta_0 + \beta_1(GPA_i) + \beta_2(TOTAL_i) + \beta_3(TRANSPER_i) + \beta_4(TAKE_i) + \beta_5(FIN_i) + \beta_6(HOURSW_i) + \beta_7(NIGHT_i) + \beta_8(DEPRIVE_i) + \beta_9(CLASS8_i) + \beta_{10}(S6_i) + \beta_{11}(F6_i) + \beta_{12}(S7_i) + \beta_{13}(F7_i) + e_i$$

where the variables in the model are defined in Table 1 save for TRANSPER which is the ratio of transfer credits to total number of hours earned.

Students with higher overall G.P.A.'s are expected to earn higher grades in corporate finance. Hence, we anticipate that the coefficient estimate on GPA will be positive and significant. We also expect that increased experience in taking college courses (TOTAL) and declaring finance as a major (FIN) will positively impact the course grade.

We suspect that transfer students (coming mainly from community colleges), students who take a high number of credit hours during the semester in which they take the finance course, and students who spend a large number of hours working for pay will struggle more in the course;

negative and significant coefficient estimates are expected on TRANSPER, TAKE, and HOURS_W. Also, we posit that sleep deprivation negatively impacts student grades; the coefficient estimate on DEPRIVE should be negative. Finally, if HOURS_W or CLASS8 adversely influence course grades, the coefficient estimates on these variables will be negative.

Although sleep hours deprived are included in the model, students who stay up late or wake up early may experience problems in the finance course that are unrelated to sleep deprivation; perhaps students simply experience mental cobwebs in the early morning hours. We likewise recognize that students themselves may over-commit to academic or extracurricular responsibilities, and in so doing contribute to the results described below. If those additional duties displace needed sleep, they might themselves have been appropriate variables to examine, but we sensed that the factor for night time work captured the spirit of this concern, in a more parsimonious fashion. . Likewise, if such factors like night time work (or other student club duties, for example) are important, our factor NIGHT will pick up that potential significance.

RESULTS

The results of the OLS model are reported in Table 2. Many of the signs are significant in the direction predicted.

<i>Variable</i>	<i>Model 1</i>		<i>Model 2</i>	
	<i>Coefficient</i>	<i>b/St.Er.</i>	<i>Coefficient</i>	<i>b/St.Er.</i>
Constant	2.498857	6.932	2.570453	6.877
GPA	0.082336	4.065	0.080481	3.943
TOTAL	0.002352	1.044	0.002335	1.027
TRANSPER	-0.24194	-1.847	-0.22845	-1.731
TAKE	0.023504	1.424	0.022066	1.327
FIN	0.377476	4.555	0.382852	4.557
HOURS _W	-0.00678	-2.206	-0.0069	-2.218
NIGHT	-0.11576	-1.439	0.103281	0.276
DEPRIVE	-0.12158	-3.963	-0.12204	-3.415
CLASS8	-0.213	-2.318	-0.26967	-1.399
S6	0.165309	1.844	0.145878	1.576
F6	0.299466	2.491	0.29233	2.402
S7	0.34537	2.951	0.337068	2.86
NIGHTCLASS8			-0.40241	-0.819
DEPRIVENIGHT			-0.30345	-0.801
DEPRIVECLASS8			0.000166	0.001
DEPCL8NIGHT			0.539593	1.071
R ²	.258		0.263	
F	8.24		6.25	

The positive and significant coefficient estimates on GPA and FIN suggest that students with higher overall G.P.A.'s and increased experience in taking college classes perform better in principles of corporate finance. Transfer students and students who worked more hours

struggled more in the class.

The negative and significant coefficient estimate on DEPRIVE suggests that three hours of sleep deprivation drops the final grade in finance by a half letter. Students who took the course at 8 a.m. lost around thirty percent of a letter grade even with the number of hours of deprived sleep controlled. Students in the spring of 2006 through the spring of 2007 fared better overall in the course than did students who took the course in the fall of 2007.

Model 2 in Table 2 includes several interaction variables. NIGHTCLASS8 is an interaction variable between students who work at night and take the finance course at 8 a.m., DEPRIVENIGHT is an interaction variable between students who report any sleep deprivation and students who work at night, DEPRIVECLASS8 is an interaction variable between students who report any sleep deprivation and students who take the finance course at 8 a.m., and DEPCL8NIGHT is an interaction between students who are sleep deprived, work at night, and take the class at 8 a.m. These dummies are not significant and do not impact the overall regression results.

Three additional models were considered subsequent to the OLS regressions. In these models, we estimated the probability of earning an A or A- (Model 1), the probability of earning an A, A-, or B+ (Model 2), and the probability of earning an A, A-, B+, or B (Model 3).

TABLE 3: PROBIT Results						
	<i>Model 1 (A or A-)</i>		<i>Model 2 (A, A-, or B+)</i>		<i>Model 3 (A, A-, B+, or B)</i>	
<i>Variable</i>	<i>Coefficient</i>	<i>b/St.Er.</i>	<i>Coefficient</i>	<i>b/St.Er.</i>	<i>Coefficient</i>	<i>b/St.Er.</i>
Constant	-7.84704	-5.824	-8.14798	-6.303	-6.35524	-5.444
GPA	1.872187	7.587	1.988451	8.341	1.926301	8.398
TOTAL	0.003084	0.478	0.006221	1.009	0.001987	0.346
TRANSPER	-0.87654	-2.276	-1.06293	-2.825	-0.70593	-2.112
TAKE	0.061557	1.354	0.060268	1.381	0.052948	1.293
FIN	0.829232	3.758	0.859101	3.895	0.689133	2.964
HOURSW	-0.00598	-0.743	-0.00732	-0.934	-0.01061	-1.355
NIGHT	0.092521	0.427	-0.23212	-1.108	0.235305	1.121
DEPRIVE	-0.16397	-1.858	-0.0737	-0.88	-0.20401	-2.526
CLASS8	-0.23418	-0.907	-0.29462	-1.171	-0.38717	-1.638
S6	0.649295	2.465	0.657259	2.605	0.919081	3.887
F6	0.19895	0.573	0.968415	2.904	0.783394	2.488
S7	0.699961	2.178	0.761415	2.391	0.774375	2.51
Ending LL	-110.2		-116.7		-124.3	
Beginning LL	-170.0		-191.1		-198.7	
Count R ²	0.35		0.39		0.37	

The results from the PROBIT models generally confirm the OLS results. Across the three models, however, hours worked did not significantly impact the probability of earning a grade of a B or above although the coefficient does, indeed, grow over the three models. This might imply a similar noteworthy, but not statistically significant, result for evening student club, intramural or other extracurricular activity, similar in timing and continuing commitment as a night time job. As well, taking an 8 a.m. class does not seem to impact the probability of earning grades over a B, but it does impact earning a B or above. Apparently, students are more likely to

earn B's if they take the course at 9:30 rather than 8:00. This may, indeed, reflect class attendance.

CONCLUSIONS

Extending prior studies, we couple class time, selected demographic factors, prior course work, current extracurricular activities and the students' perceptions of their own sleep needs in describing grading outcomes in an introductory finance class.

What exactly is the significance of a students overall work, study and sleep habits in describing finance class grades?

We test a premise that student performance in general, and among introductory finance students in particular, can be described by the sleep habits, outside work, maturity, age and background of the students. Not widely or currently available in the extant economics or finance literature, we find evidence to support our premises: Student performance is enhanced with more adequate sleep, in classes starting later than 8:00 AM, for students who do not work, and for students who complete their undergraduate studies at a single school. We find older students doing better, and we find the 8:00 findings are uniformly robust. Our findings are important to student, educator, counselor and administrator.

Given regular student aversion to early morning classes, as well, what role might be played by the earliest morning classes, alone, in explaining introductory finance student grades?

It is the sleep deprivation measure that is the most robust among our new explanatory factors, and while the 8:00 class standing alone is not necessarily always the one which "suffers" from the greatest portion of sleep-deprived students, the tendency of this class' students to be the most sleep-deprived is obvious. The 8:00 student is at greater relative risk of underperforming due to inadequate sleep than is the case with classes at other times.

A recurring theme among educators in business schools, across campuses and at many universities in the southeast, is the lack of space and inadequate facilities. While it can be easily argued that facilities at many universities are often crowded, it likewise cannot be claimed they are always crowded; from late afternoons, to weekends, to extended faculty and student vacations, classroom space is often dark and unoccupied. Balancing university needs against the potentially better performance of students in classes other than those scheduled at 8:00 may be a valuable first step in receiving this research. Planned extensions of these findings likely will include marginal amendments to the conduct of existing morning classes, towards anticipating and potentially tempering some of this study's findings.

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