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Predictors of Performance in Introductory Finance: Variables within and beyond the Student's Control

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Abstract

This study examined variables that are within and beyond the control of students in explaining variations in performance in an introductory finance course. Regression models were utilized to consider whether the variables within the student's control have a greater impact on course performance relative to the variables beyond the student's control. Among the particular variables within the student's control were the student's inclination to procrastinate as evidenced by the relative delay the students exhibited in commencing online homework assignments. Also, separate measures were constructed to examine the effect of the accuracy of the homework submitted and the student's actual completion of those assignments. Class attendance was also considered. The variables largely beyond the control of the student examined in this study were a measure of how far along in the undergraduate program the student had progressed when he/she enrolled in the introductory finance course, a measure of the credit load of the student in the semester when the student took the course, the student's gender, the student's overall academic ability and the relative strength of the student in comprehending quantitative versus verbal concepts. For the three measures of student performance studied, average homework grade, the mid-term exam grade and the final exam grade, all of the relevant variables within the student's control demonstrated some impact on the various measures of performance. There was persuasive evidence that the variables within the student's control were more influential in explaining differences in student performance than the variables beyond the student's control.

Keywords: attendance, higher education, homework accuracy, homework completion, procrastination, student performance

1. Introduction

This paper considers the impact of variables within and beyond a student's control that influence the student's performance in an introductory college finance course. Several measures of student performance are analyzed—student grades on online homework assignments, the mid-term grade and the grade on a comprehensive final exam. Of course, it is also of interest to examine which of the variables within the control of the student appear to have a statistically significant impact on the various measures of performance. Such findings may guide the instructor in formulating his/her appeals to the students to modify their mix of course related activities (including the use of grade incentives to encourage more productive activities) in order to achieve a greater mastery of the course material.

Regression models are presented which explain student variations among the three measures of student performance. For the regression model explaining homework grades, the variables that are within the control of the student are (a) student attendance, (b) an observed (as distinct from a self-reported) measure of procrastination in the average time a student is delaying the initial accessing of the online homework assignments, and (c) the number of homework assignments completed. In the regression model explaining performance on the mid-term exam, the variables within the student's control are the same three considered in the model explaining homework performance plus a variable for average scores for the homework assignments. Of course, in the model explaining performance on the mid-term exam, all of the student behavior variables are measured only for that portion of the semester leading up to the mid-term. For the regression model explaining the final exam, the explanatory variables reflecting student behavior would be similar to the list of variables in the mid-term exam model, except the independent variables are measured over the entire course.

In all three models explaining student performance (for homework grades, the mid-term and the final exam), control variables are included which do not reflect student course behaviors: the number of credits completed at the outset of the semester to measure how far along a student is in his/her academic program, the number of academic credits that student is taking during the semester as a measure of the overall weight of the student's academic load, a binary variable measuring the student's gender, the student's sum of verbal and quantitative scores on the SAT exam as a measure of the student's overall ability, and the ratio of quantitative to verbal SAT scores as a measure of the extent to which a student's abilities are more skewed to quantitative or verbal tasks.

2. Literature Review

Among the variables within the control of the student that influence the student's performance is the student's inclination to procrastinate. As indicated by Wang and Englander (2010), student procrastination has generally received more attention among scholars addressing variations in student performance from an educational psychology perspective. Among the researchers investigating variations in student performance in various business disciplines, variables such as class attendance (Romer, 1973) hours of labor market work (Nonis & Hudson, 2006) and level of commitment to homework assignments (Rich, 2006) have received more attention.

2.1 Procrastination

Academic procrastination has been the subject of many studies concerned with student behavior over the past several decades. Steel's (2007) meta-analysis of this research considered 553 possible analyses and winnowed those studies down to 216 separate research efforts. Steel's (2007) review of the literature reveals that estimates of the proportion of college students who procrastinate ranges as high as eighty to ninety-five percent. Three-fourths of college students recognize that they are procrastinators and nearly half of college students engage in procrastination "consistently and problematically" (Steel, 2007, p. 65). Activities that occupy students while they engage in procrastination include sleeping, watching television and engaging in active recreation. Such activities, designed to delay the execution of tasks to be performed, are said to typically occupy over one third of the students' daily activities. Steel (2007) further reports on evidence that such procrastination behaviors are increasing over time. The research evidence supports the view that procrastination is generally harmful to the procrastinator's ability to successfully perform his/her responsibilities. Consistent with that point, procrastination is found to be harmful to the well-being of those affected, leading to procrastinators "being more miserable in the long term" (Steel, 2007, p. 65). Hence, it is not surprising that O'Brien (2002) finds that over ninety-five percent of procrastinators recognize that they would be better off if they could procrastinate less and Knaus (2002) reports that sixty percent of college students believe that professional therapy is required to prevail over procrastination induced behaviors.

Steel cites a number of research works which highlight the possible beneficial aspects of procrastination (Bernstein, 1998; Chu & Choi, 2005; Ferrari, 1993). Chu and Choi (2005) identify "active procrastinators" who *prefer* to work under pressure and therefore deliberately choose to procrastinate. Bernstein (1998) justified the possibility that procrastination may be beneficial by arguing, "Once we act, we forfeit the option of waiting until new information comes along. As a result, no-acting has value. The more uncertain the outcome, the greater may be the value of procrastination." (p. 15)

Steel's (2007) meta-analysis of academic procrastination found a weak, but consistently negative relationship between student procrastination and various measures of academic performance such as overall GPA, course grades, final exam scores and assignment grades. However, as reported by Kim and Seo (2015), there are some studies (Seo, 2011; Solomon & Rothblum, 1984) that did not find statistical significance in this relationship and other studies (Brinthaupt & Shin, 2001; Schraw & Wadkins, 2007) which found a statistically positive link between procrastination and academic performance.

2.2 Homework Assignments

Another potentially important variable that may influence student academic success is homework. One economist (McMullen, 2007) has written that homework as a learning tool should be seen as a variable that impacts academic achievement and is within the control of the student, as distinct from the physical or other characteristics of the schools that students attend or the extent of or nature of the training that teachers receive. McMullen's (2007) research indicates that homework plays a more central role in influencing student success than other variables that are beyond the student's control. This approach of considering homework as a strategic variable designed to increase student achievement as a possible alternative to other approaches (e.g., varying class sizes, utilizing a separate recitation section in large classes, varying the number of class meetings per week, utilizing instructors who use different proportions of their own time doing research) was also applied by Zietz and Cochrane (1997) who found that regular homework assignments and comprehensive final exams were more cost effective strategies

to increase student performance.

McMullen (2007) also acknowledges that determining an appropriate measure of homework *input* for the purpose of measuring the impact of homework on student achievement (i.e., *output*) has been a formidable task among those that have conducted research on the importance of homework in the learning process. For example, he focused on the time that a student spends on homework in considering the statistical relationship between homework and student achievement. Betts (1996) considered the hours of homework assigned to the student in this context. Grodner and Rupp (2013) studied the influence of the dichotomous imposition of a requirement to do homework and the students' completion of homework assignments on achievement. The Grodner and Rupp (2013) results reinforce the findings of Emerson and Mencken (2011) who also found that the dichotomous act of assigning mandatory homework increased student exam performance.

Weems (1998), who examined the effectiveness of the instructor's practice of collecting homework in order to promote a higher level of student performance, found no statistically significant results. Ryan and Hemmes (2005) focused on the effect of rewarding students with extra credit toward their semester grade if the student submitted a greater proportion of homework assignments. Such inducements were found to increase the proportion of homework assignments completed and the quiz grades that were based on that material. Likewise, Grove and Wasserman (2006) studied whether an additional grade incentive to complete problem sets were effective in raising exam scores. They found that such incentives were effective for average students (based on past academic performance), but not effective for students deemed above or below average. Radhakrishnan, Lam and Ho (2009) did not find that such incentives for homework completion had a significant impact on exam performance.

With respect to the practice of collecting and grading homework assignments that have been submitted to an instructor (as distinct from collecting, but not grading assignments), Artés and Rahona (2013) examined the effect of collecting and grading homework assignments in an undergraduate economics class in Spain and determined that this practice had a substantial and statistically significant positive impact on exam performance. Geide-Stevenson (2009) found that instructor grading of homework assignments in an introductory college economics course did not have a significant impact on exam scores, although there was evidence of a more salutary effect of grading the homework for freshman and sophomores as compared to grading the homework of juniors and seniors.

Another important issue in measuring or defining the homework variable for the purpose of determining the impact of homework on student achievement relates to whether homework is measured in terms of the proportion of homework assignments completed or the accuracy (proportion of problems done correctly) of the submitted homework. Oliver and Williams (2005) argued that these two indicators are conceptually distinct (i.e., accuracy assumes completion, but completion does not allow inferences regarding accuracy) and our understanding of the role of homework in explaining student achievement would be advanced if studies attempt to separate these two dimensions of homework performance. Oliver and Williams (2005, pp. 143-144) observed, "There is little, if any, research at the college level comparing the effects of these … contingencies." Oliver and Williams' (2005) study of the impact on exam scores of both the accuracy and completion of practice exams indicated that while both measures were directly and significantly related to students' performance on the actual exams given in the course, the accuracy measure had a stronger impact than the completion measure.

Rayburn and Rayburn (1999) found that student achievement on exams was directly and significantly related to homework completions. Trost and Salehi-Isfahani (2012) determined that homework completions had a statistically significant and positive effect on exam performance for the mid-term exam, but not for the final exam. Grodner and Rupp (2013) found that homework completions were also directly and significantly related to exam performance. In none of these three studies was homework accuracy considered.

Allain and Williams (2006) found that homework accuracy had no significant impact on test scores in an introductory college astronomy course, but homework completions were not studied. Similarly, Stack (2015) found that exam performance was not statistically related to homework accuracy in an undergraduate research methods/statistics course, but homework completions were not considered. Caudill and Long (2009) found a significantly positive impact of homework accuracy on exam performance, but did not separately consider the effect of homework completions. The present study, following the precedent offered by Oliver and Williams (2005), attempts to separately measure the impact of homework accuracy and completions on course performance.

2.3 Class Attendance

The beneficial impact of class attendance on student exam performance has been extensively studied in the education literature. Recent analyses by Andrietti (2014) and Mearman, Pacheco, Webber, Ivlevs and Rahman (2014) provided thorough reviews of the existing literature exploring the relationship between college class

attendance and student performance. Another important contribution to this literature is offered by Credè, Roch and Kieszczynka (2010) who undertook a meta-analysis of fifty-two published articles and sixteen unpublished dissertations and research papers which examined the link between class attendance and exam performance. That meta-analysis determined that attendance has a direct and statistically significant link to class grades and overall GPA. Further, class attendance was found to be "a better predictor of college grades than any other known predictor of academic performance, including scores on standardized admissions test such as the SAT, high school GPA, study habits and study skills" (Credè et al., 2010, p. 272). Credè et al. (2010) explain their findings in terms of the greater and more varied interaction that students have with course material in the classroom than they would have in other modes such as textbook reading or accessing online material. They also argue that classroom attendance provides students with a more evenly distributed interaction with course content than what they regard as the likely alternative to regular class attendance—concentrated cramming for exams.

3. Research Method

The fifty-three students observed in this study, thirty-five male and eighteen female, represent a convenience sample from among the undergraduate students who enrolled in the first finance course that was required of business majors at a campus of about 2400 undergraduate students at a private university in the northeast. The average SAT verbal and quantitative scores among the fifty-three student subjects analyzed in this paper were 498 and 535, respectively. A comparison of these averages to the national average SAT verbal and math scores in 2009 for college bound seniors, the relevant comparison group for those students in the United States who were Juniors in 2012, found that the comparative SAT scores were 501 and 515, respectively (College Board, 2009), These comparisons strongly suggest that the cohort of students who participated in the current study were representative, from the standpoint of overall academic ability, to students very near the median in a national distribution of students who were Juniors during the study period. Such a finding is suggestive of a higher level of generalizability of the results offered by the current study. The business program at this university is AACSB accredited. These students were enrolled in two sections of that course taught by the same instructor during the same semester, i.e., Fall 2012. Not included in the sample were those students who enrolled in the third section of that course taught by a different instructor. Students normally take this course in their junior year, as evidenced by the fact that the median number of credits completed among the fifty-three members of the student sample at the outset of the course was sixty (out of the approximately 120 credits required for graduation).

Ordinary least squares regression models were developed to compare the impact of the variables within and beyond the students' control in explaining variations in three measures of student performance—the average grade on homework assignments, the mid-term exam grade and the final exam grade. Standardized beta coefficients are examined (Gujarati & Porter, 2009; Woolridge, 2013), in order to compare the relative effect on student performance of the explanatory variables that are within and beyond the students' control.

The homework assignments were accessed by the students on the university provided Blackboard™ website. The procrastination data that was calculated for each homework assignment is based on the time interval between the moment that each assignment becomes available to the students in each section of the course and the deadline by which each assignment must be submitted online (both endpoints of this time interval are determined and announced in advance by the instructor). The actual measure of procrastination is based on the computation of the proportion of that interval that has been exhausted at the precise point in time (to the second) at which the student opens the relevant assignment. Of course, if a student has not submitted an assignment within the allotted time interval, that homework is designated as not having been completed. There were eight homework assignments during the semester. Students were informed at the outset of the semester that homework assignments would count as twenty percent of the course grade. The mid-term exam, given approximately halfway through the semester accounted for thirty-five percent of the semester grade and the final exam accounted for thirty-five percent of the semester grade. (Also ten percent of the semester grade was based on a financial analysis project.) It should be noted that difficulties with the university computer system prevented the measurement of procrastination for the first two homework assignments, but did not interfere with the automatic grading of those assignments or the counting of instances where students did not complete their assignments. Depending on the topic being covered in the introductory finance course, the homework assignments, the mid-term exam and the final exam were a mixture of qualitative and quantitative questions. For each topic, the types of questions that appeared on the mid-term and final exams were similar to the questions provided in the homework assignments. Attendance was routinely measured by the instructor who recorded the students who were present in each class.

The explanatory variables utilized in the student performance regression equations below examine the impact of procrastination, homework-related variables and attendance on several measures of student performance. Also included in these regression equations are a number of control variables:

(1) Credits Completed (Chan, Shum, & Wright, 1997; Shum & Chan, 2000, who found a positive relationship between student performance in finance courses and credits completed) to measure how far along a student is in his/her undergraduate program at the outset of the semester when the student is enrolled in the introductory finance course,

(2) Credits Attempted which measures the overall academic workload taken on by the student in that semester where he/she has enrolled in the introductory finance course (Borg, Mason, & Shapiro, 1989; Lynn, 2006, who found a negative link between academic performance in business courses and credits attempted),

(3) Gender in order to examine if, *ceteris paribus*, performance in this introductory finance course tends to be higher among male or female students (Tatum & Childers, 2013, who report (a) earlier studies on the effect of gender on performance indicate that female students are at a disadvantage and (b) more recent studies show no systematic effect of gender),

(4) SAT Total Score, summing the quantitative and verbal components in order to account for overall student ability on the student's performance (many studies find student ability to be positively linked to performance, including Shum & Chan, 2000; B. Van Ness, Van Ness, & Adkins, 2000, who observe this pattern in a finance course) and

(5) SAT Ratio of the quantitative component of the SAT to the verbal component of the SAT in order to examine if, for any given level of overall student ability, students who have relatively stronger quantitative ability (relative to their verbal ability) are at a greater advantage in taking introductory finance (Shum & Chan, 2000; Englander, Terregrossa, & Wang, 2009).

4. Results

The first measure of student performance to be examined with the use of a regression model is the average grade that students earned on the eight homework tasks assigned over the semester. One possible approach to measuring that dependent variable would be to assign a grade of zero to uncompleted homework assignments (i.e., assignments not submitted through the Blackboard™ online website before the deadline announced by the instructor). On that basis, Table 1 is presented which accounts for student variations in average homework grades in terms of the series of explanatory variables discussed above (with the expected sign of each variable in parenthesis)—Procrastination in accessing the online homework assignment (-), Number of Completed Homework assignments (-), class Attendance (+), Credits Completed at the outset of the course (+), Credits Attempted during the semester in which the student was enrolled in introductory finance (-), Gender (+ or -), SAT Total Score (summing the quantitative and verbal components) (+), SAT Ratio of quantitative score to verbal score (+).

Table 1. Average homework grade (Non-submitted homeworks assigned a grade of zero)

Model	Coefficients	Std. Error	Beta	t-value	p-value	VIF
(Constant)	-17.495	23.403		-.748	.459	
Procrastination	-8.054	5.598	-.099	-1.439	.079	1.317
# Completed HWs	11.834	1.035	.852	11.430	.000	1.540
Attendance	-.021	.151	-.009	-.137	.446	1.205
Credits Completed	.107	.060	.120	1.789	.040	1.244
Credits Attempted	.050	.597	.006	.083	.467	1.216
Gender	.319	2.020	.010	.158	.875	1.158
SAT Total	-.004	.009	-.028	-.416	.339	1.295
SAT Ratio	8.638	6.315	.086	1.368	.089	1.092
Model F-score = 29.172		p-value = 3.6E-15		Adj. R^2 = .813		n= 53

The results in Table 1 offer support to the *ex ante* hypothesis that Credits Completed, as a measure of how far along the student is in his/her undergraduate program, is significantly (at the .05 level) and directly related to average homework scores. The results also indicate positive relationship between homework scores and the quantitative to verbal SAT Ratio, significant at the .10 level. However, an examination of the standardized beta coefficients in these results reveals that the number of Completed Homework assignments variable has a very strong positive and significant impact on the dependent variable, average homework score.

This result relating to Completed Homework assignments can be explained by the fact that if an uncompleted homework is assigned a grade of zero for the purpose calculating the average homework score, a direct, mechanical relationship between the dependent variable and the number of Completed Homework assignments is established such that any non-completed homework reduces the value of the # Completed Homework variable and, at the same time, also reduces the value of dependent variable. Thus it becomes very difficult to determine the extent to which students who did not submit even a few of their homework assignments may or may not be subject to a reduced understanding or mastery of the material covered in the homework assignments.

One approach to avoiding this mechanical relationship between # Completed Homework assignments and average homework scores would be to define the dependent variable, average homework scores, such that non-completed homework assignments would not be counted in the computation of the average homework scores, i.e., such non-submitted homework assignments would be excluded from the averaging process in computing the dependent variable. Another advantage of this computational procedure would be that in the regression models below, which seek to explain variations in student grades on the mid-term and final exams, it would then be possible, as Oliver and Williams (2005) recommended, to separately measure (1) the influence of homework scores, as a measure of student accuracy or proficiency in such practice activities (for those homework assignments that were completed) as well as (2) the influence of # Completed Homework assignments, as a measure of appropriate student effort or competent time management. Applying this computational approach of excluding non-completed homework assignments in the computation of the average homework score, Table 2 is presented which explains student average homework scores in terms of the same independent variables presented in Table 1.

The Table 2 findings again indicate that # Completed Homeworks have a positive and significant link to average homework grades and the beta coefficient for the # Completed Homeworks variable suggest that this variable has a stronger impact on average homework grades than the other explanatory variables, but the effect is not nearly as outsized as suggested by the Table 1 results. Procrastination had the expected negative association with the average homework scores which was significant at the .10 level. Attendance in class meetings did not have a significant relationship to average homework scores. Among the control variables, only the SAT Ratio of quantitative to verbal scores was significantly (at the .10 level) linked to the dependent variable. That relationship, as expected, was positive, suggesting that more quantitatively able students had higher homework scores. Among the three variables (Procrastination, # Completed Homeworks and Attendance) that are within the control of the student, the beta coefficients suggest that the # Completed Homework variable had the strongest association with average homework scores, followed by Procrastination and Attendance. The relatively strong effect on average homework grade exerted by # Completed Homeworks suggests that even under a regime where non-submitted homeworks are not considered in the computation of average homework scores (i.e., homework accuracy), a failure to complete and submit homework assignments is shown to adversely impact understanding of the concepts in those other homework assignments that have been submitted. Class attendance did not register a significant impact on average homework scores. The F-test result indicates that the regression equation as a whole was statistically significant.

Table 2. Average homework grade (excluding non-submitted homeworks)

Model	**Coefficients**	**Std. Error**	**Beta**	**t-value**	**p-value**	**VIF**
(Constant)	66.118	26.199		2.524	.015	
Procrastination	-9.031	6.267	-.209	-1.441	.079	1.317
# Completed Homeworks	2.346	1.159	.318	2.024	.025	1.540
Attendance	-.067	.169	-.055	-.399	.346	1.205
Credits Completed	.119	.067	.251	1.781	.041	1.244
Credits Attempted	-.198	.669	-.041	-.296	.385	1.216
Gender	.391	2.261	.024	.173	.863	1.158
SAT Total	-.004	.010	-.064	-.446	.329	1.295
SAT Ratio	9.790	7.069	.183	1.385	.087	1.092
Model F-score = 2.310		p-value = 0.037		Adj. R^2 = .168		n= 53

Note. Avg. Homework Grade: Excluding the zero scores associated with student homework assignments that were not submitted.

One concern in examining the influence of several variables within the student's control on a measure of academic performance such as average homework scores is the possibility that all of the relevant variables, Procrastination, # Completed Homeworks and Attendance may all be strongly related to, or be a proxy for, student effort. If all of these variables are clearly related to one another and tend to move in a given direction as other variables or conditions change, such a pattern would suggest that such variables are collinear. The presence of such collinear variables could artificially increase the variance of the standard errors of the respective explanatory variable coefficients, thus biasing downward the t-test results for those collinear variables and leading to unreliable interpretations of the statistical significance of the affected variables. One common approach of diagnosing the presence of collinear explanatory variables is to determine a Variance Inflation Factor (VIF) for each of the explanatory variables in a regression equation (Lind, Marchal, & Wathen, 2008). The VIF score is provided in the far right column of each of the tables in this paper. A common interpretation applied in such cases where there is a concern for the presence of collinearity is that if a VIF score exceeds ten, such a result would support a hypothesis of collinearity among explanatory variables. If the VIF score is less than ten, such a hypothesis of collinearity would not be supported (Lind, Marchal, & Wathen, 2008). In Table 2 the VIF scores are all well below ten, suggesting that collinearity and the problems that it creates in interpreting the statistical significance of explanatory variables, is not a meaningful problem.

Table 3 presents the regression results explaining variations in student performance on the mid-term exam and utilizes a model that is similar to the model described in Table 2. It should be noted that the Procrastination, # Completed Homeworks, and Attendance variables are all based on the data collected for those variables up to the point of the mid-term exam (which include five of the semester's eight homework assignments), rather than for the entire semester (as was the case for Tables 1 and 2). The regression model explaining student performance on the mid-term exam also includes a variable to account for homework accuracy for the segment of the semester leading up to the mid-term. That homework accuracy variable is the Average Homework Grade, calculated so that homework assignments not submitted (reflected in the # Completed Homeworks variable) are not included in the average. Again, this computation approach allows separate measures of homework accuracy and homework completion to be determined for the purpose of examining the distinct influences of these two homework related factors, as Oliver and Williams (2005) prescribed.

Table 3. Midterm exam grade

Model	**Coefficients**	**Std.Error**	**Beta**	**t-value**	**p-value**	**VIF**
(Constant)	3.400	25.020		.136	.893	
Procrastination	-4.601	5.322	-.113	-.865	.196	1.281
# Completed Homeworks	-.496	2.232	-.032	-.222	.413	1.580
Avg. Homework Grade*	.539	.151	.505	3.577	.000	1.506
Attendance	.336	0.178	.254	1.887	.033	1.373
Credits Completed	.037	.069	.069	.533	.299	1.257
Credits Attempted	-.319	.679	-.058	-.469	.321	1.173
Gender	-1.582	2.389	-.084	-.662	.511	1.208
SAT Total	.014	.010	.180	1.413	.083	1.220
SAT Ratio	-6.770	7.288	-.111	-.929	.179	1.085
Model F-score = 3.617		p-value = .002		Adj. R^2 = .312		n= 53

Note. *Avg. Homework Grade: Excluding the zero scores associated with student homework assignments that were not submitted.

Considering the Table 3 results that deal with variables which are within the student's control, the mid-term exam performance was inversely related to Procrastination, as expected, but that finding was not statistically significant. The direct relationship between mid-term exam performance and both the Average Homework Grade variable and the Attendance variable were statistically significant and consistent with *a priori* expectations. The # Completed Homeworks variable, significant in explaining homework accuracy, was not significantly related to performance on the mid-term exam. Following the guide to the interpretation of standardized beta coefficients offered by Gujarati and Porter (2009) and Woolridge (2013), a review of the beta coefficients for the first four independent variables indicates that among the variables within the students' control, the Average Homework Grade had the

greatest impact in explaining the mid-term exam grade. Among the control variables, outside the student's control, only the SAT Total score, combining the quantitative and verbal scores, had a significant influence on the mid-term exam grade. That positive association was significant only at the .10 level. The VIF scores, all in the range of 1.085 to 1.580, indicate that there is very little evidence of a pattern of collinear explanatory variables biasing the interpretation of the statistical significance of the various explanatory variables. The F-test for the Table 3 model indicates that the model as a whole is statistically significant. The variables in that model explained 31.2 percent of the variation among students in the mid-terms grades.

Table 4 presents the regression results for the model explaining variations in student performance in the final exam. The explanatory variables included in Table 4 are the same as what is presented in Table 3, except for the fact that the collection of variables within the student's control (Procrastination, # Completed Homeworks, Average Homework Grade and Attendance) are calculated over the whole semester rather than the portion of the semester leading up to the mid-term. Among those variables within the student's control, Procrastination was found to be inversely related to the final exam grade, as expected, and the result was significant at the .05 level. The Average Homework Grade had the expected direct relationship to the final exam grade, a result that was significant at the .01 level.

Attendance had the expected positive link to final exam performance and was significant at the .05 level. Therefore, among the four variables within the student's control, all but the number of Completed Homeworks were significantly related to final exam performance in the expected direction. The beta coefficient results for these three significant variables within the student's control indicate that Average Homework Grade was substantially more influential in accounting for variations in final exam performance than Procrastination (second in ranking among the three variables) and Attendance.

Table 4. Final exam grade

Model	**Coefficients**	**Std. Error**	**Beta**	**t-value**	**p-value**	**VIF**
(Constant)	16.268	28.548		.570	.572	
Procrastination	-15.654	6.532	-.291	-2.397	.016	1.379
# Completed Homeworks	-.992	1.234	-.108	-.803	.213	1.684
Avg. Homework Grade*	.485	.154	.389	3.159	.001	1.420
Attendance	.372	.172	.246	2.162	.018	1.210
Credits Completed	.091	.070	.155	1.299	.100	1.334
Credits Attempted	.110	.682	.018	.161	.437	1.218
Gender	-4.587	2.304	-.221	-1.991	.053	1.159
SAT Total	-.002	.010	-.018	-.156	.439	1.301
SAT Ratio	7.432	7.355	.111	1.011	.159	1.140
Model F-score = 5.647		p-value = 2.3E-05		Adj. R^2 = .446		n= 53

Note. *Avg. Homework Grade: Excluding the zero scores associated with student homework assignments that were not submitted.

Among the control variables, Credits Completed had the expected direct link to final exam performance, a result that was very nearly significant at the .10 level. This finding is consistent with those of Shum and Chan (2000) and Chan, Shum and Wright (1997) who also found that student performance in finance classes was higher among students further along in their undergraduate program. The final exam scores were not significantly related to the students overall SAT scores or the SAT ratio of quantitative to verbal scores. In the absence of an *a priori* hypothesis regarding the influence of the student's gender on finance course performance, the results in Table 4 suggest that females tend to perform better on the final exam than males. This result is nearly significant at the .05 level. Note that Table 2 also offers some evidence of better performance on the mid-term exam by females, but that result is not nearly statistically significant.

Again, the VIF scores do not provide evidence that a pattern of collinearity was present among the explanatory variables accounting for variations in student final exam scores. The F-statistic for the equation as a whole indicates a high degree of statistical significance for this model analyzing final exam scores. The adjusted R-squared for the model was .446, substantially higher than the models in Table 2 and Table 3 which explained

variations in homework grades (excluding non-submitted homework assignments) and the mid-term exam, respectively.

5. Discussion

This paper has analyzed variations in student performance among a sample of fifty-three students in two sections of an introductory finance course which was required of business students at an AACSB accredited university in the northeast. Student performance was measured by the average grades on assigned homework over the semester, the mid-term exam grade and the final exam grade. One may infer from all of the regression equations that were estimated in this study that the impact of variables considered that are within the control of the student (completion of homework assignments, average scores on homework assignments, procrastination and class attendance) were substantially more influential in explaining variations in student performance than those variables considered (credits completed at the outset of the course, credits attempted during the semester when the introductory finance course was taken, gender, the sum of the SAT scores on the quantitative and verbal components and the ratio of the SAT quantitative score to the verbal score) that are largely beyond the control of the student.

We believe this finding that the variables that are within the control of the student are substantially more important than those variables over which the student has little control has potentially important implications. This finding should empower students. To the extent that the results reported here can be generalized among other students taking similar courses, it is possible for an instructor to tell his/her students, "Your fate is in your own hands". You should exhibit responsible behaviors—attending class regularly, taking homework assignments seriously by making a strong effort to answer the questions correctly, submit homework assignments on a regular basis and make a strong effort to avoid unnecessary delay in the initiation of homework assignments and other course related tasks. Perhaps instructors who accept the evidence offered by this study might explain to their students, "It may be tempting to do less work in this course based on an assumption that a better grade is beyond your reach, but there is research which finds that the behaviors that are within your control have a stronger influence on your grade than the forces beyond your control".

The current paper also offers perspective on some of the earlier studies of student performance discussed in the literature review section. McMullen (2007) concluded that homework tasks "play a central role in determining student success". A review of the results of the current study did find that homework accuracy was the most important variable explaining student performance on the mid-term and final exams. Hence, the emphasis that McMullen (2007) places on student efforts in striving to achieve greater accuracy in the completion of homework tasks appears to be appropriate.

Credè et al. (2010, p. 272) found that class attendance was "a better predictor of college grades than any other known predictor of academic performance". The current study finds that attendance was a statistically significant predictor of grades on the mid-term and final exams, but in neither case was it the strongest predictor, a distinction going to homework accuracy.

Finally, Oliver and Williams (2005) observed that a limitation in the earlier research on homework and its relationship to student performance has been the lack of analysis of the separate effects of homework accuracy and homework completion. They found that accuracy and completion had a statistically significant impact on performance, the influence of the former being greater than the latter. The findings of the current study are that homework completion had a significant impact in explaining average homework scores (i.e., accuracy). However, when homework accuracy and completion are separately considered in models explaining the mid-term and final exam grades, homework accuracy had the expected statistically significant positive impact on student performance, but the influence of homework completion was insignificant in both cases.

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