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Chien-Chih Peng  
*Morehead State University*

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**Can Grade Inflation in Prerequisite Courses Affect Student Performance in Business Finance?**

Chien-Chih Peng, Morehead State University

**Abstract**

The purpose of this study is to determine the effect of grade inflation in prerequisite courses on student performance in business finance. Some studies indicate that performance in business finance can be affected by performance in prerequisite courses. The ordered-probit regression model is employed to analyze a sample of 229 students during the period from 2005 to 2009. The results indicate that students who earned higher grades in prerequisite mathematics and economics courses are more likely to perform better in business finance. Grade inflation generally is not a significant determinant in explaining student performance in business finance. However, students who received highly curved grades in financial accounting are more likely to perform better in business finance. The results suggest that the quantitative knowledge that students obtain prior to the business finance course has an impact on their performance in the course. Grade inflation in the prerequisite courses except for financial accounting does not seem to affect student performance in finance. Business students should be serious about the quantitative-oriented prerequisite coursework. Instructors should constantly improve their teaching skills, and administrators should maintain the rigor of curriculum and provide instructors with necessary support to help business students to complete the program successfully.

**Keywords:** Grade inflation, business finance, academic performance, college teaching.

**Introduction**

“Professor, do you curve grades in this course?” This question is usually raised on the first day of the business finance class. Students ask the question because business finance (or introductory finance), one of the required business core courses in any typical business program, is quantitative in nature and it is as difficult to get a high grade in this class as it is to get a good mark in the prerequisite courses such as college algebra, financial accounting, managerial accounting, microeconomics, and macroeconomics.

Grading on a curve has been an accepted method of student assessment. In essence, the practice of grading on a curve was based on the assumption that in classes where there are hundreds of students, students’ scores will most likely be normally distributed. Wedell et al. (1989) argue that “exam scores tend

to be normally distributed for well-constructed, norm-referenced, multiple choice tests.” In reality, grading on a curve has a variety of meanings to students and instructors. Students usually perceive grading on a curve as a practice of assigning extra credit assignments or adding points to all grades to increase the highest test scores to the 100 point level. This practice of mean-shift grading is not grading on a curve but grade inflation, as defined in Hu (2005).

Though research studies show that students who perform well in accounting, economics and mathematics are expected to perform well in business finance, in reality, the finding may not be true when grade inflation is involved in the prerequisite courses. If students are not well-prepared, it is inevitable that business finance instructors will spend time reviewing basic financial

accounting concepts, economic analysis, and algebra. The prerequisite courses taught by various instructors who are different in gender, personality and professional rank can have different levels of expectation and grading policies (e.g., Kezim et al. (2005), Sonner (2000), and Sonner et al. (1993)).

In effect, students' proficiency in prerequisite courses may not meet with the business finance instructors' expectation. Moreover, since these prerequisite courses are challenging courses to most of the students, it is likely that some instructors inflate students' grades. For example, Cluskey and Griffin (1997) find that grade inflation exists in some accounting courses. Becker (1997) also states "Economics is among the lower-grading departments; thus, economists have room to inflate grades to buy students." Inflating students' grades in these courses may send an unintended and erroneous message about student academic preparedness to business finance instructors.

Research studies in financial education have identified the determinants of student performance in the undergraduate business finance. Didia and Hasnat (1998) find that aptitude as measured by cumulative grade point average (GPA), background as measured by average grades in accounting prerequisites, economics prerequisites, and high school mathematics, maturity as measured by age, and effort as measured by hours of study are significant determinants of student performance in the introductory finance course. Borde, et al. (1998) find that gender, transfer status, cumulative GPA, hours of work, and average grade

in prerequisite accounting courses are significant determinants of student performance in introductory corporate finance course. Another study by Terry (2002) finds that student performance in the introductory corporate finance course is significantly related to gender, major, exam type, grades in prerequisite classes, cumulative GPA and whether the course is taken during the summer.

The course delivery method can also affect student performance. Shum and Chan (2000) find that remote-site interactive television students have statistically significant poorer performance relative to regular students while Van Ness, et al. (2000) find that students who take introductory corporate finance online receive lower grades than those who take the class in a traditional classroom setting. Focusing on the effect of students' proficiency in prerequisite coursework, Grover et al. (2010) hypothesize that student performance in the introductory finance course would be affected by the knowledge brought to the course as measured on a quantitative pretest given at the beginning of the course. They find that mathematics and accounting knowledge have a greater effect on performance in the introductory finance class than economics knowledge.

This study attempts to extend existing studies by taking a closer look at the relationship between student performance in prerequisite courses and student performance in business finance, and examines whether grade inflation in prerequisite courses can explain student performance in business finance. The following sections describe the data and research method, and report the results, conclusions, and limitations of this study.

**Data and Methodology**

This study was conducted at a four-year state university in the Appalachian region. The College of Business and Public Affairs, accredited by the AACSB International (Association to Advance Collegiate Schools of Business), has three departments: the Department of Accounting, Economics, and Finance, the Department of Information Systems, and the Department of Management and Marketing. Business finance, an introductory finance course, is a required core course for all business majors. According to the advised course taking sequence, prior to taking business finance, business students are required to complete college algebra, principles of macroeconomics and principles of financial accounting in the freshman year, and principles of microeconomics and principles of managerial accounting in the sophomore year.

The two hundred and twenty-nine students in my nine sections of business finance from 2005 to 2009 are the subjects in this empirical study. A questionnaire was used to collect information about student characteristics, academic background, and learning experience at the beginning of each semester. To capture the effect of grade inflation in prerequisite courses, I included a question concerned with whether instructors in prerequisite courses assigned extra credit assignments or “curved” (or added points to) exam scores / course grades. The students’ grades in business finance were based on homework assignments (25%), quizzes (20%), and exams (55%), which were not graded on a curve and did not include any extra credit assignments.

Since the data for this study depends on students self-reporting their own experience with grade inflation, the reliability of the data may be questionable. In other words, students may not possess legitimate information on or may ignore the existence of grade inflation, which is a limitation of the measure. However, because of the adequate sample size and the fact that this study avoids the confounding effects of different instructors and different teaching methods, there is some applicability to address the relationship between grade inflation in prerequisite courses and student performance in business finance. Table 1 shows the description of the variables used in this study.

Many finance education research studies examining the determinants that affect student performance in introductory finance course use the standard production function approach, where output is the grade received and inputs are factors consisting of student characteristics such as maturity, background, aptitude, effort, and course delivery method. The ordered-probit regression analysis is employed to determine if grade inflation in prerequisite courses affects student grades when controlling for student characteristics. The ordered-probit model is preferred since our dependent variable – student grades in FIN 360 – is both ordinal and discrete. The ordered-probit model is specified as  $Y_i^* = X_i\beta + \epsilon_i$  with

$$Y_i = \begin{cases} 0 & \text{if } Y_i^* \leq \mu_0 \\ 1 & \text{if } \mu_0 < Y_i^* \leq \mu_1 \\ 2 & \text{if } \mu_1 < Y_i^* \leq \mu_2 \\ 3 & \text{if } \mu_2 < Y_i^* \leq \mu_3 \\ 4 & \text{if } Y_i^* > \mu_3 \end{cases}$$

where  $Y_i$  are the observed student grades in business finance as follows: A = 4, B = 3, C = 2, D = 1, and E = 0;  $Y_i^*$  is the unobservable 'true student grade';  $X_i$  is a vector of variables that describe student

characteristics;  $\beta$  is a vector of coefficients;  $\mu_i$  are the threshold parameters to be estimated along with  $\beta$ ; and  $\epsilon_i$  is a disturbance term that is assumed normally distributed.

**Table 1: Variable Description**

Variable	Description
FIN360	Student's final grade in business finance; A = 4, B = 3, C = 2, D = 1, E = 0
AGE	Student's age in years when enrolled in business finance
GENDER	Binary variable: 1 if the student's gender is male; 0 otherwise
FROM	Binary variable: 1 if the student is an in-state student; 0 otherwise
ACCFIN	Binary variable: 1 if the student is an accounting or finance major; 0 otherwise
IS	Binary variable: 1 if the student is an information system major; 0 otherwise
MM	Binary variable: 1 if the student is a management or marketing major; 0 otherwise
GPA	Student's cumulative grade point average before enrolling to business finance
TRANSFER	Binary variable: 1 if the student transferred to the university in the study; 0 otherwise
CAMPUS	Binary variable: 1 if the student lives on the campus; 0 otherwise
WORKHR	Number of hours spent working per week on average
F2F	Binary variable: 1 if business finance is delivered in classroom; 0 otherwise
M152G	Student's final grade in college algebra; A = 4, B = 3, C = 2, D = 1, E = 0
M152C	Binary variable: 1 if the grade for college algebra was inflated; 0 otherwise
A281G	Student's final grade in principles of financial accounting; A = 4, B = 3, C = 2, D = 1, E = 0
A281C	Binary variable: 1 if the grade for principles of financial accounting was inflated; 0 otherwise
A282G	Student's final grade in principles of managerial accounting; A = 4, B = 3, C = 2, D = 1, E = 0
A282C	Binary variable: 1 if the grade for principles of managerial accounting was inflated; 0 otherwise
E201G	Student's final grade in principles of macroeconomics; A = 4, B = 3, C = 2, D = 1, E = 0
E201C	Binary variable: 1 if the grade for principles of macroeconomics was inflated; 0 otherwise
E202G	Student's final grade in principles of microeconomics; A = 4, B = 3, C = 2, D = 1, E = 0
E202C	Binary variable: 1 if the grade for principles of microeconomics was inflated; 0 otherwise

### Empirical Results

Table 2 reports the descriptive statistics for the sample. The mean course grade in business finance is 2.21 or a low "C". The mean age of students

is 24 years with the range from 19 to 67 years. The sample is almost evenly split between male and female students, although there are a few more females than males. Seventy-eight percent of the

**Table 2: Descriptive Statistics**

Variable	# of Obs.	Mean	Std. Dev.	Minimum	Maximum
FIN360	229	2.214	1.226	0	4
AGE	203	23.749	6.297	19	67
GENDER	228	0.469	0.500	0	1
FROM	225	0.782	0.414	0	1
ACCFIN	229	0.293	0.456	0	1
IS	229	0.140	0.347	0	1
MM	229	0.489	0.501	0	1
GPA	196	3.083	0.463	2	4
TRANSFER	204	0.338	0.474	0	1
CAMPUS	204	0.225	0.419	0	1
WORKHR	203	15.495	16.002	0	76
F2F	229	0.838	0.369	0	1
M152G	184	2.783	0.979	0	4
M152C	185	0.303	0.461	0	1
A281G	199	2.749	0.947	0	4
A281C	200	0.390	0.489	0	1
A282G	195	2.856	0.831	1	4
A282C	198	0.394	0.490	0	1
E201G	198	2.742	0.912	1	4
E201C	199	0.538	0.500	0	1
E202G	194	2.722	0.884	1	4
E202C	196	0.393	0.490	0	1

students are in-state students. Out of the sample, twenty-nine percent of the students are majoring in accounting and finance, fourteen percent are seeking a degree in information systems, and forty-nine percent are majoring in management and marketing. The mean grade point average is 3.08 with the range from 2 to 4. Thirty-four percent of the students are transfer students, and twenty-three percent of the students live on campus. Sixty-eight percent of the students have a job while taking business finance, and their average number of hours worked in a week is almost 16. Eighty-four percent of the students take business finance in a face-to-face setting.

The remaining descriptive statistics are concerned with student performance in prerequisite courses. The mean course grade in college algebra is 2.8 or in the “C” range, and thirty percent of the students indicate that their instructors inflate their grades. The mean course grade in principles of financial accounting is 2.7 or in the “C” range, and thirty-nine percent of the students indicate that their instructors inflate grades. Another prerequisite accounting course, the principles of managerial accounting, has a mean course grade 2.9 or in the “C” range, and thirty-nine percent of students indicate that their instructors inflate grades. The mean course grade in principles of macroeconomics is 2.7 or in the “C” range, and fifty-four percent of the students indicate that their instructors

inflate grades. Another prerequisite economics course, the principles of microeconomics, has a mean course grade 2.7 or in the “C” range, and thirty-nine percent of the students indicate that their instructors inflate grades.

Table 3 shows regression results in five different model specifications. The five regression specifications with common independent variables show that in-state/out-of-state status, major, grade point average, and delivery method are significant determinants of student performance in business finance. The coefficients of FROM are negative and significant at the 5% level, suggesting that in-state students are more likely to perform worse than out-of-state students. The coefficients of ACCFIN are generally positive and significant except for Regression (5), suggesting that accounting and finance students are more likely to perform better than students with other majors. GPA has positive significant coefficients implying that students with higher grade point averages prior to the enrollment in business finance are more likely to perform better than those with lower grade point averages. Finally, the coefficients of F2F have positive signs and are significant at the 1% level, suggesting that students in face-to-face sections are more likely to perform better than those in online sections. This finding is consistent with other studies in economics such as Trawick et al. (2010) and Howsen and Lile (2008).

**Table 3: Ordered Probit Regression Results on the Relationship between Business Finance and Prerequisite Courses**

	Regression (1)		Regression (2)		Regression (3)		Regression (4)		Regression (5)	
	Coeff.	z-stat	Coeff.	z-stat	Coeff.	z-stat	Coeff.	z-stat	Coeff.	z-stat
AGE	-0.017	-1.173	-0.009	-0.619	-0.023	-1.479	-0.018	-1.252	-0.029	-1.436
GENDER	-0.171	-0.993	-0.166	-1.007	-0.156	-0.927	-0.222	-1.316	-0.214	-1.249
FROM	-0.517	-2.351**	-0.445	-2.123**	-0.416	-1.964**	-0.410	-1.986**	-0.518	-2.406**
ACCFIN	1.216	2.767***	1.200	2.820***	0.810	1.861*	0.850	2.068**	0.676	1.429
IS	0.614	1.326	0.544	1.202	0.277	0.597	0.378	0.851	0.122	0.245
MM	0.908	2.099**	0.795	1.880*	0.477	1.102	0.581	1.431	0.338	0.713
GPA	1.316	5.691***	1.468	6.138***	1.579	6.519***	1.183	5.022***	1.241	5.005***
TRANSFERR	0.045	0.231	0.031	0.161	0.015	0.079	-0.051	-0.268	0.021	0.109
CAMPUS	-0.104	-0.478	0.015	0.071	0.072	0.334	0.042	0.202	-0.032	-0.150
WORKHR	-0.002	-0.320	-0.004	-0.634	-0.005	-0.876	-0.003	-0.603	-0.006	-1.104
F2F	1.400	4.927***	1.343	4.799***	1.399	5.008***	1.251	4.444***	1.323	4.651***
M152G	0.175	1.727*								
M152GI	0.002	0.036								
A281G			-0.108	-0.964						
A281GI			0.109	1.839**						
A282G					-0.034	-0.272				
A282GI					-0.010	-0.169				
E201G							0.265	2.253**		
E201GI							-0.003	-0.047		
E202G									0.285	2.275**
E202GI									0.001	0.018



# of obs.	177	190	186	189	185
Log(L)	-214.53	-229.74	-223.93	-228.59	-216.35
Pseudo R <sup>2</sup>	18.43%	18.61%	19.52%	18.57%	21.25%

M152GI = M152G × M152C; A281GI = A281G × A281C; A282GI = A282G × A282C; E201GI = E201G × E201C; E202GI = E202G × E202C. \*\*\*Significant at the 1% level; \*\*Significant at the 5% level, \*Significant at the 10% level.

Regression (1) examines the relationship between performance in college algebra and performance in business finance. The coefficient of M152G is positive and significant at the 10% level, suggesting that students who had higher grades in college algebra are more likely to perform better in business finance than those who had lower grades in college algebra.

This finding is consistent with other studies in economics and business statistics (Cohn et al.1998); Rochelle and Dotterweich (2007)). The interaction term, M152GI defined as M152G × M152C, is used to measure whether there is any difference in performance between students who had and who did not have their grades inflated in college algebra. The coefficient of M152GI is positive, but insignificant, suggesting that grade inflation in college algebra does not affect student performance in business finance.

Regressions (2) and (3) examine the relationship between performance in prerequisite accounting courses and accounting with less rigorous course requirements.

The coefficients of A281G in Regression (2) and A282G in Regression (3) are negative but insignificant, suggesting that there is no strong relationship between performance in prerequisite accounting courses and performance in business finance.

The interaction term, A281GI in Regression (2) defined as A281G × A281C, is used to measure whether there is any difference in performance between students who had and who did not have their grades inflated in financial accounting. The coefficient of A281GI is positive and significant at the 5% level, suggesting that students who had their grades inflated in financial accounting are more likely to perform better in business finance than those who did not have their grades inflated in financial accounting. If the rigor of course requirements has a negative impact on students' grades, it is likely that instructors who imposed more rigorous requirements have a propensity to inflate students' grades.

Following this assumption, the regression result implies that though their grades were inflated, students who were trained in financial accounting with more rigorous course requirements may perform better in business finance than students who were trained in financial

Another interaction term, A282GI in Regression (3) defined as A282G × A282C, is used to measure whether there is any difference in performance between students who had and who did not have their grades inflated in managerial accounting. The coefficient of A282GI is negative, but insignificant, suggesting that grade inflation in managerial accounting does

not affect student performance in business finance.

Regressions (4) and (5) examine the relationship between performance in prerequisite economics courses and performance in business finance. The coefficients of E201G in Regression (4) and E202G in Regression (5) are positive and significant at the 5% level, suggesting that students who had higher grades in prerequisite economics courses are more likely to perform well in business finance than those who had lower grades. The interaction terms, E201GI in Regression (4) defined as  $E201G \times E201C$  and E202GI in Regression (5) defined as  $E202G \times E202C$ , are used to measure the difference in performance between students who had and who did not have their grades inflated in prerequisite economics courses. Both coefficients for E201GI and E202GI are insignificant, suggesting that grade inflation in economics courses does not have an effect on student performance in business finance.

### Conclusion

The results in this research study suggest that the quantitative knowledge that students obtain prior to the business finance course has an impact on their performance in the course. In effect, business students should be serious

about the quantitative-oriented prerequisite coursework, instructors should constantly improve teaching skills to train business students properly, and administrators should maintain the rigor of curriculum and provide instructors with necessary support to help business students be successful in the program.

Mathematics and economics knowledge appear to be more important than accounting knowledge in affecting performance in finance. Grade inflation in the prerequisite courses except for financial accounting does not seem to affect student performance in finance. In addition, in-state/out-of-state status, major, grade point average, and delivery method are found to be significant determinants of student performance in finance, which is generally consistent with prior research.

Because the sample used in this study was obtained from students at one university under one instructor, this research represents only a preliminary attempt at the issue. Collecting student data from different institutions to increase the sample size may lead to more robust findings. The research methodology in this study can be used by other disciplines to examine the effect grade inflation in prerequisite courses has on student performance.

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Chien-Chih Peng is Associate Professor of Finance at Morehead State University.