Distance Education and MBA Student Performance in Finance Classes

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ABSTRACT

This paper examines the performance of a group of traditional and distance education MBA students in graduate finance classes. In contrast to the majority of previous empirical results, we find a significant difference in performance between the two groups. Controlling for a variety of student characteristics that have been documented to affect graduate academic achievement, distance students earn higher grades than traditional on-campus students. Several design elements of this program are suggested as possible explanations for the superior performance of the distance students.

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INTRODUCTION

Over the last several decades, a variety of technological and competitive factors have been reshaping the way many business schools operate. Technological changes have provided opportunities to change the way course material is taught, and a highly mobile workforce has stimulated demand for advanced education that is delivered outside the traditional classroom setting. In reaction to this demand, competition from non-university sources has increased [Davis and Botkin, 1994], which has led some analysts to debate the fundamental value of the degrees offered and research produced by business schools [Pfeffer and Fong 2002, 2003; and Connolly 2003]. Despite any controversy or skepticism [Farinella, Hobbs and Weeks 2000], even universities steeped in tradition have begun delivering courses through non-traditional means.[1] In fact, many universities now offer courses through a variety of distance delivery methods (Internet streaming, DVD or video-taped lectures, etc.) or a blend of traditional classroom instruction and distance delivery.[2] As the process of providing educational services evolves, it is appropriate to evaluate the efficacy of these different educational delivery methods. The focus of this study is to examine educational outcomes in several finance classes for distance and on-campus MBA students.

PREVIOUS LITERATURE

There is an extensive literature reviewing the effectiveness of various instructional delivery methods, much of which is documented by Russell [1999] in *"The No Significant Difference Phenomenon."* Citing studies from as far back as the 1920s, Russell compiled a bibliography of 355 studies that show no significant difference in learning outcomes from technology-aided instruction. He summarized these studies by concluding that the use of *"…technology does not denigrate instruction. This fact opens doors to employing technologies to increase efficiencies, circumvent obstacles, bridge distances, and the like. It also allows us to employ cheaper and simpler technologies with assurance that outcomes will be compatible with the more sophisticated and expensive ones as well as conventional teaching/learning methods."* [Russell, 1999, p. xiii] This body of work has important implications for distance education courses, including Internet based courses, televised video courses, and the like. It suggests that the use of different educational technologies will not necessarily improve or detract from learning outcomes, but that the students, the instructor, and the design of the course will be the most important factors.

Recent articles have examined distance education issues in a variety of fields, including communications [Eaton, 2003], management [Crow et al., 2003], marketing [Jones and Kelley, 2003], logistics [Shanahan, 2003], and engineering [Kariya, 2003]. Common threads from this literature include the idea that distance learning technologies signal a permanent shift in the way educational content is delivered, and that previously unserved, geographically dispersed part-time students as well as traditional full-time on-campus students can benefit from moving more course content online. Another consistent

theme is that without adequate planning for the challenges provided by distance education, problems of several varieties can become substantial. Some researchers have looked at faculty attitudes and institutional issues relating to distance education efforts; these issues include faculty workloads and evaluations, intellectual property questions, and other institutional issues [Barth, 2004; and Farinella, Hobbs, and Weeks, 2000]. Burton [1998] also noted there could be substantial economies of scope between offering traditional on-campus classes and distance versions of those same classes together. The instructional model referred to by Burton is essentially the instructional model used in the classes examined in this paper.

There are several studies identifying different factors that might be useful indicators of general classroom success for MBA students. The predictive ability of Graduate Management Admissions Test (GMAT) scores and undergraduate GPAs has been examined by Wright and Palmer [1994, 1997], and Yang and Lu [2001], who also consider other factors that may help predict academic success for MBAs. Looking at gender issues, Hancock [1999] found that while women scored significantly lower on the GMAT, there was no difference in subsequent academic performance in MBA classes. These studies all examine performance in the entire MBA program, and do not focus on the specific performance factors in graduate finance classes.

In a study examining undergraduate student performance in introductory corporate finance classes, Terry [2002] found that prior GPA, grades in prerequisite classes, major, gender, and exam structure were significant predictors of student performance. However, once the sample was split by exam type (multiple choice or not), the gender and major variables were not significant. Undergraduate major and prior GPA were also found to be

statistically significant predictors of student performance in introductory economics classes by Caudill and Gropper [1991].

We extend this literature by studying the performance of students in several different MBA finance courses, and we examine differences in performance between students taking the course in traditional form, as compared to those taking the same course through distance education delivery. In contrast to previous studies examining performance of on-campus versus distance students, our results control for additional student characteristics that affect performance [Phipps and Merisotis, 1999, p. 3].

BACKGROUND AND DATA

Data are gathered from almost 200 students enrolled in required and elective finance classes in the subject MBA program, over a period from 2002 to 2004. All data are obtained from students in the College of Business at an AACSB-accredited business school in the United States with over 4000 students, of which roughly 500 are graduate students.

The MBA finance classes studied here are offered in two delivery modes; a traditional on-campus setting, and via distance delivery. The distance MBA program has been in place since 1990, and is designed to provide a flexible option for fully employed students who desire an alternative to completing their degree in a traditional classroom setting. On-campus lectures are captured by video cameras, copied to videotape or DVD, and mailed to the distance students. Experiments with streaming lectures over the Internet have been tried, but most students choose DVDs rather than Internet streaming. Students from across the United States also take the same course, and MBA program policy is that they complete all assignments and exams within two weeks of when they are due for on-

campus students. The on-campus students have some advantages over their distance counterparts; the on-campus students can more easily get help from each other, visit the professor during office hours, and readily participate in live class discussions. While distance students have the disadvantage of being relatively isolated, they can view and review lectures and take exams at times they find most convenient, and they still have ready access to the professor for questions via email or telephone.[3]

To help ensure the integrity of the examination process, proctoring arrangements for each exam are made and certified for every student, typically with a human resources manager in the organization where they work. In addition, both the on-campus and distance education students are governed by an MBA student honor code and the disciplinary mechanisms in place at the university. Annual enrollment is approximately 100 full-time on-campus MBA students and 250 distance MBA students. Following review of the policies and procedures, all College programs, including the distance MBA program option, were reaccredited by the AACSB in 1997, and by the Southern Association of Colleges and Schools (SACS) in 2004.

THE MODEL

We posit that student performance in MBA finance courses is a function of a student's intellectual ability, preparation, and motivation. Students need to have sufficient human capital to succeed; they need the intellectual capacity to learn the material, and the fundamental set of communication and mathematical skills to complete the assignments. They also need to have the motivation to bring their capabilities to focus on the issues raised in their classes. With this in mind, if we are to compare and contrast the performance

between distance and on-campus students in these finance classes, we must control for these characteristics.

The two performance measures we examine are the final percentage grade (*PGRADE*) and letter grade (*LGRADE*) in each finance course. To model elements of their human capital, we look at indicators of ability and prior performance. Thus, our explanatory variables include the student's undergraduate grade point average (*UGPA*). We also include a dummy variable indicating whether the student had a quantitative undergraduate major, which we define to include finance, accounting, economics, or engineering (*UQUANT*). While the use of standardized test scores is sometimes questioned [Thayer and Khalat, 1998], we included these in our regressions as possible indicators of ability and preparation in two ways; either the total GMAT score (*GMAT*), or disaggregated into the verbal portion percentile (*GMATV*), and quantitative portion percentile (*GMATQ*). In addition, a dummy variable (*CORE*) indicates whether the course was the required core finance course in the MBA program, or an elective class. This variable helps address the selectivity issues inherent in modeling student performance across course type. Since we are interested in looking at the effect of distance education delivery on student outcomes, we include a dummy variable indicating whether the individual was a distance or on-campus student (*DISTANCE*).

[Insert Table 1 about here]

Table 1 presents descriptive statistics for our sample. As shown in the first column, the undergraduate GPA (*UGPA*) for the entire sample averages just over a 3.2, and the average Graduate Management Admissions Test (*GMAT*) score is slightly under 580. Roughly half of the students have a quantitative undergraduate background (*UQUANT*). Of

the total sample approximately 40 percent are traditional on-campus students and 60 percent are distance students. The second and third columns of Table 1 show the sample statistics for the on-campus students and the distance students separately. There are several statistically significant differences between the two student groups. Both performance measures (*PGRADE* and *LGRADE*) are significantly higher for the distance students. On average, distance students perform better, with a mean *PGRADE* of 90.3 versus 81.7 for the on-campus students and an average *LGRADE* of 3.6 versus 3.1.

In addition, several of our explanatory variables to capture student human capital factors are different between the two samples. While the on-campus students have higher undergraduate GPAs (3.3 versus 3.2), they have lower GMAT scores (566 versus 586). While a simple Z-test rejects the null hypothesis of equal mean performance between the on-campus and distance students, multiple regression analysis can be used to examine whether or not this difference is fully explained by the human capital differences in the two groups, or whether some difference remains to be attributed to the instructional delivery method.

[Insert Table 2 about here]

Table 2 shows correlation coefficients that provide preliminary evidence on the relation between student characteristics and academic performance. Consistent with previous studies, both the undergraduate GPA and the total GMAT score are significantly positively correlated with measures of student performance in finance classes, with correlation coefficients between 0.15 and 0.22. However, there is little correlation between the students' percentile scores on the qualitative and quantitative portions of the GMAT. Overall, grades are lower in the core finance course relative to elective finance courses as

shown by the correlation coefficients of -0.31 and -0.18 between the variable for the required finance course (*CORE*) and the two performance measures, *PGRADE* and *LGRADE*. As documented in Table 1, distance students tend to have higher GMAT scores but lower undergraduate GPAs than on-campus students.

EMPIRICAL RESULTS

Given the correlations in Table 2, we first use a multivariate regression to estimate the marginal impact of being a distance student on the final percentage grade (*PGRADE*) in a graduate finance class.[4] Table 3 presents the results of OLS regressions using GMAT scores, undergraduate GPA, and three dummy variables based on whether the course was a core finance class (*CORE*), whether the student had a quantitative undergraduate major (*UQUANT*), and whether the student was a distance student (*DISTANCE*).

[Insert Table 3 about here]

In Model 1, the coefficient estimates for undergraduate GPA, the dummy variable indicating a core course, and the distance student dummy variable are significantly different from 0. As expected, undergraduate GPA is positively related to the student's percentage grade in the course (a point estimate of 5.12 and a standard error of 1.54). The coefficient point estimate for the distance dummy variable of 7.12 is different from 0 at the 1% significance level. Thus, conditional on other student and course attributes, the average distance student's final percentage grade is 7 points higher than that of an on-campus student. In contrast to Yang and Lu [2001], the total GMAT score is not significantly related to students' performance after controlling for additional variables.

Model 2 replaces the total GMAT score with the percentile GMAT (or GRE) verbal and quantitative scores (*GMATV* and *GMATQ*). The results are consistent with those from Model 1; GPA and distance status are positively related to performance while the GMAT scores are not significantly related to the students' final percentage grades.

Since approximately 5% of our sample is international students that do not have undergraduate GPAs comparable to those from U.S. institutions, Models 3 and 4 examine the effect of omitting the GPA variable. Again, the results are similar, with distance students conditionally scoring approximately 7 points higher in the graduate finance courses. The GMAT scores are found to have a positive marginal relation to student performance in the absence of information about undergraduate GPAs. Somewhat surprisingly, a quantitative undergraduate background is not found to be significantly related to student performance in any of the regressions.

Since the *DISTANCE* dummy variable was always significant, we further explored differences in all the regression coefficients between on-campus and distance students. Chow tests reject the null hypothesis that the intercept and slope coefficient estimates are equal for the samples of on-campus versus distance students for all four models at the 1% significance level.

We next turn to students' letter grades (*LGRADE*) in the finance courses as our measure of performance. Table 4 presents the results of a multinomial logit regression with the letter grade as the dependent variable. As in previous studies, undergraduate GPA and total GMAT score are positively related to student performance. The statistically significant negative coefficient estimates indicate a *lower* probability of obtaining a *lower*

grade in the class the *higher* the value of the independent variable. The results again indicate that GMAT scores are marginally related to student performance in our sample.

[Insert Table 4 about here]

As in Table 3, the *DISTANCE* variable is not only significant again in all regression specifications, it also indicates that distance students tend to perform better than on-campus students. For example, in Model 1, the coefficient estimate of -1.68 for the *DISTANCE* variable translates into distance students being 17% more likely to earn an 'A' in the class relative to on-campus students (conditioned on the sample averages for the other explanatory variables).

For both of our performance measures, we find strong evidence that distance students outperform on-campus students in graduate finance classes. This superior performance of more than half a letter grade exists even after controlling for the different characteristics of the two groups of students.

CONCLUSION AND COMMENTARY

Although on-campus and distance students certainly receive a different educational experience, analysis of our sample indicates that distance students in finance classes certainly do not perform worse than their on-campus counterparts. In fact, controlling for differences in student characteristics, distance students outperform the traditional on-campus students by a significant margin.

There are several limitations to generalizing these results. Finance classes are different than many of the "soft skill" classes in the MBA program, and the leadership, negotiation, and group interaction skills learned in a traditional class setting may not be

delivered in a distance setting as readily as the material in the finance classes studied here. Our results do not control for selection bias in the sense that students may self-select into the type of program where they will perform better. Our performance measures also do not measure all aspects of an MBA education. Superior performance in finance courses is only one aspect of student success in a graduate program (obviously other aspects, such as starting salaries or employment offers may be more important to students than grades). Finally, there remains the possibility that faculty inherently have different grading policies for on-campus versus distance students. While much of the finance material is quantitative, grading of the majority of the exams given are at least somewhat subjective in nature (as opposed to multiple choice) and there is the possibility that exams for the two students are not graded in an unbiased fashion. However, we see no reason that any bias would necessarily favor distance students.

In evaluations completed by the distance MBA students, they indicate that the flexibility of the program, both in watching lectures and completing exams, is a key to their ability to balance full-time work and successfully complete their coursework. While the student may miss the face-to-face contact of the traditional classroom, having lectures on tape or DVD, and watching difficult portions several times if necessary, can contribute to better learning outcomes. This may explain the improved performance of the distance students. Furthermore, the option to fit their exams around their work schedule, and potentially move them by a day or two within the two-week exam window, can certainly contribute to improved performance. Clearly, some of this flexibility could be adapted to traditional on-campus finance classes. Whether faculty and administrators in traditional settings wish to do so is an entirely different and very interesting question.

ENDNOTES

1. Some of the traditional Universities offering MBA degree programs delivered in part or totally through distance education means include Auburn University, Colorado State University, Duke University, the University of Florida, Indiana University, Purdue University, Syracuse University, and the University of Tennessee. Sizeable for-profits include the University of Phoenix and Capella University, among others.

2. There are a number of directories that describe the offerings of each institution; for example see GetEducated.com's *Best Distance Learning Graduate Schools: Business and Management* [2004].

3. On-campus students do not have generally have access to the DVDs of lectures provided to the distance students.

4. The data for the multivariate estimations in Tables 3 and 4 do not contain the 8 students that entered the MBA program with doctoral degrees and thus did not have GMAT scores.

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Table 1
Sample descriptive statistics

Means (standard deviations in parentheses) for the sample of MBA students taking a finance course. PGRADE is the percentage grade in the finance course; LGRADE is the letter grade (A=4, B=3, …) in the finance course; GMAT is the student's GMAT score; GMATV is the student's percentile score on the verbal portion of the GMAT or GRE; GMATQ is the student's percentile score on the quantitative portion of the GMAT or GRE; UGPA is the student's undergraduate grade point average; BUS is a dummy variable equal to 1 if the student's undergraduate degree is in business (0 otherwise); UQUANT is a dummy variable equal to 1 if the student's undergraduate major is in economics, finance, accounting, or engineering (0 otherwise); CORE is a dummy variable equal to 1 if the student was enrolled in the core finance course (0 if the course was an elective). N is the number of observations in each sample.

	Total	On-campus	Distance	Z-test mean / median
PGRADE	86.63	81.70	90.27	*** / ***
	(9.41)	(10.10)	(6.91)	
LGRADE	3.41	3.12	3.62	*** / ***
	(0.76)	(0.83)	(0.63)	
GMAT	577.78	566.35	585.75	** /
	(60.75)	(58.09)	(61.55)	
GMATV	65.66	63.00	67.72	* /
	(19.40)	(19.80)	(18.92)	
GMATQ	52.63	50.26	54.46	/ *
	(21.16)	(22.31)	(20.15)	
UGPA	3.25	3.30	3.21	* /
	(0.38)	(0.32)	(0.41)	
UQUANT	0.54	0.52	0.55	
	(0.50)	(0.50)	(0.50)	
CORE	0.51	0.55	0.47	
	(0.50)	(0.50)	(0.50)	
N	196	83	113	

Table 2
Sample correlations

Pearson correlations for the sample of 196 MBA students taking a finance course. PGRADE is the percentage grade in the finance course; LGRADE is the letter grade (A=4, B=3, …) in the finance course; DISTANCE is a dummy variable equal to 1 if the student is a distance student (0 otherwise); GMAT is the student's GMAT score; GMATV is the student's percentile score on the verbal portion of the GMAT or GRE; GMATQ is the student's percentile score on the quantitative portion of the GMAT or GRE; UGPA is the student's undergraduate grade point average; UQUANT is a dummy variable equal to 1 if the student's undergraduate major is in economics, finance, accounting, or engineering (0 otherwise); CORE is a dummy variable equal to 1 if the student was enrolled in the core finance course (0 if the course was an elective). Correlations significantly different from 0 at the 1%, 5%, and 10% levels are denoted by ***, **, and *, respectively.

	PGRADE	LGRADE	DISTANCE	GMAT	GMATV	GMATQ	UGPA	UQUANT
LGRADE	0.833***							
DISTANCE	0.451***	0.324***						
GMAT	0.220***	0.153**	0.158**					
GMATV	0.144**	0.057	0.121*	0.573***				
GMATQ	0.119	0.119	0.098	0.752***	-0.048			
UGPA	0.184**	0.196***	-0.112	0.096	0.128*	0.051		
UQUANT	0.082	0.163**	0.030	0.178**	-0.051	0.202***	-0.032	
CORE	-0.314***	-0.180**	-0.084	-0.116	-0.068	0.091	-0.004	-0.001

Table 3
Regression results

Estimates from an OLS regression where the dependent variable is the student's percentage grade (PGRADE) in a finance course. The independent variables are defined as follows: DISTANCE is a dummy variable equal to 1 if the student is a distance student (0 otherwise); GMAT is the student's GMAT score; GMATV is the student's percentile score on the verbal portion of the GMAT or GRE; GMATQ is the student's percentile score on the quantitative portion of the GMAT or GRE; UGPA is the student's undergraduate grade point average; UQUANT is a dummy variable equal to 1 if the student's undergraduate major is in economics, finance, accounting, or engineering (0 otherwise); CORE is a dummy variable equal to 1 if the student was enrolled in the core finance course (0 if the course was an elective). Standard errors are in parentheses. Coefficient estimates significantly different from 0 at the 1%, 5%, and 10% levels are denoted by ***, **, and *, respectively.

	Model 1	Model 2	Model 3	Model 4
Intercept	59.38***	63.47***	74.41***	80.31***
	(7.07)	(5.56)	(5.64)	(2.77)
DISTANCE	7.22***	7.53***	6.65***	7.27***
	(1.22)	(1.22)	(1.18)	(1.19)
GMAT	0.01		0.02*	
	(0.01)		(0.01)	
GMATV		0.03		0.04
		(0.03)		(0.03)
GMATQ		0.02		0.02
		(0.03)		(0.03)
UGPA	5.12***	5.42***		
	(1.54)	(1.55)		
UQUANT	1.79	1.75	1.60	1.61
	(1.18)	(1.18)	(1.17)	(1.20)
CORE	-5.18***	-5.55***	-4.90***	-5.55***
	(1.17)	(1.18)	(1.16)	(1.18)
Adj. R^2	0.31	0.31	0.26	0.28
N	166	171	179	187

Table 4
Logit model estimates

Estimates from maximum likelihood estimates of a multinomial logit model where the dependent variable is the student's letter grade (A=4, B=3, …) in a finance course. The independent variables are defined as follows: DISTANCE is a dummy variable equal to 1 if the student is a distance student (0 otherwise); GMAT is the student's GMAT score; GMATV is the student's percentile score on the verbal portion of the GMAT or GRE; GMATQ is the student's percentile score on the quantitative portion of the GMAT or GRE; UGPA is the student's undergraduate grade point average; CORE is a dummy variable equal to 1 if the student was enrolled in the core finance course (0 if the course was an elective). Standard errors are in parentheses. Coefficient estimates significantly different from 0 at the 1%, 5%, and 10% levels are denoted by ***, **, and *, respectively.

	Model 1	Model 2	Model 3	Model 4
Intercept 0	3.21 (2.27)	1.72 (1.78)	-1.06 (1.66)	-3.23*** (0.98)
Intercept 1	3.92** (2.21)	2.43 (1.71)	-0.35 (1.58)	-2.29*** (0.81)
Intercept 2	5.45** (2.18)	3.93** (1.67)	1.18 (1.52)	-0.93 (0.72)
Intercept 3	8.23*** (2.23)	6.73*** (1.71)	3.68** (1.54)	1.59** (0.71)
DISTANCE	-1.68*** (0.36)	-1.66*** (0.35)	-1.22*** (0.31)	-1.25*** (0.31)
GMAT	-0.01* (0.01)		-0.01** (0.01)	
GMATV		-0.01 (0.01)		-0.01 (0.01)
GMATQ		-0.01 (0.01)		-0.01* (0.01)
UGPA	-1.46*** (0.47)	-1.53*** (0.46)		
CORE	0.94** (0.33)	0.92* (0.33)	0.63** (0.31)	0.68** (0.30)
Likelihood ratio index	0.14	0.13	0.08	0.08
N	167	172	180	188