

ANALYZING MAJOR FIELD TEST IN BUSINESS ASSESSMENT RESULTS

William R. Word
University of South Carolina Upstate
Professor of Economics
160 East St. John Street, Spartanburg, SC 29306
bword@uscupstate.edu
864-503-5510

Sarah P. Rook
University of South Carolina Upstate
Professor of Economics
160 East St. John Street, Spartanburg, SC 29306
srook@uscupstate.edu
864-503-5584

Abstract

This research demonstrates an approach for analyzing the results of the Educational Testing Service (ETS) Major Field Test in Business (MFTB). The MFTB is one of the assessment instruments used at this small public AACSB-International accredited undergraduate business program. MFTB results are analyzed for groups of students in the business program: concentrations in accounting, economics, general business, management, and marketing. Performance variation among the concentrations is explained by differences in student quality, curriculum, and faculty grading policies. One concentration's MFTB performance presents an anomaly.

Analyzing Major Field Test in Business Assessment Results

Introduction and Methods

The purpose of this paper is to present a structured analysis of one school's Major Field Test in Business (MFTB) results in order to assist other schools in more fully understanding the reasons for their assessment differences among disciplines and major fields of study. At this school, most (but not all) of the differences can be explained by student quality, course requirements, and faculty grading policies. This type of analysis may reveal opportunities for improvement in student learning with curriculum or faculty deployment changes.

The Major Field Test in Business is sponsored by Higher Education Assessment of the Educational Testing Service (ETS) and covers foundation course content taught in a typical undergraduate business program. The MFTB multiple-choice questions cover topics in nine subject areas: accounting, economics, management, quantitative business analysis, information systems, finance, marketing, legal and social environment, and international issues. The Major Field Test in Business has been used for many years by a large number of business schools as an assessment tool for their programs. **Much research has focused on the relationship between student characteristics and MFTB performance (such as, Contreras, Badau, Chien and Adrian (2011) and Bycio and Allen (2007)). The focus of this research is the use of MFTB for program assessment.** Various studies have shown how the MFTB scores may be used for program improvement (Bush et al. 2008; McLaughlin and White 2007; Word, Rook and Lancaster 2011).

Upon request, the ETS will make available to schools detailed information to assist with assessment efforts. ETS provides comparative data for MFTB performance. The Institutional Means Total Score Distribution Table and the Institutional Assessment Indicator Mean Score Distribution Table convert the raw scores to percentiles. Reporting percentiles allows the comparison of school performance with all other domestic schools administering the test. This paper analyzes the results for three recent semesters when the business school requested MFTB scores for groups of students to enhance the potential analysis of this assessment tool. The groups were the students in each business concentration: accounting, economics, general business, management, and marketing. This additional reporting allows for many new comparisons among students, curricula, and faculty for the concentrations.

This small public university business program enrolls about 800 undergraduate business students and awards approximately 170 Bachelor of Science in Business Administration degrees per year. Each business student completes general education courses, a business core (13 courses) and a business concentration (7 courses). The required business core courses are Financial Accounting, Managerial Accounting, Principles of Macroeconomics, Principles of Microeconomics, Probability and Statistics, Statistical Inference, Introduction to Business Information Systems, Legal Environment of Business, Principles of Marketing, Business Finance, Organizational Management and Behavior, Operations Management, and Business Policy. The student may choose a concentration in accounting, economics, general business, management, or marketing.

Analysis

In Table 1, three semesters of MFTB results for this school are presented. The weighted average percentile is the percentile reported each of the three semesters weighted by the number of students. For example for the first cell in the table (the accounting subject area for accounting students), the semester one percentile score was 85th percentile for 15 accounting students, for semester two, the percentile score was 95th percentile for 9 accounting students, and for semester three, 95th for 18 students. The weighted percentile score is $[(85)(15) + (95)(9) + (95)(18)]/42 = 91$. Ninety one percent of the institutional means in the accounting subject area were at or below this institution's mean performance in accounting by accounting students.

Table 1						
Three Semesters of MFTB Weighted Percentile Scores by Concentration and Subject Area (n = number of students)						
	Concentrations					
	n = 42	n = 27	n = 54	n = 73	n = 53	n = 249
Subject Area	Accounting	Economics	General Business	Management	Marketing	Overall
Accounting	91	59	32	51	28	58
Economics	83	95	56	55	33	69
Management	71	73	32	39	42	44
Quantitative Analysis	95	95	88	84	74	91
Finance	83	83	44	45	28	53
Marketing	78	83	53	65	71	70
Legal / Social Issues	71	72	59	30	43	51
Information Systems	71	69	37	76	37	59
International Issues	74	86	29	52	29	53
Overall	86	88	47	55	42	61

This paper will analyze these cell differences found in Table 1. For example, why do accounting and economic majors score better in international issues? Why do general business majors score better in economics and marketing than in management? And why do marketing majors score so low in accounting and finance?

There was a wide range of percentile scores for these students. The weighted overall test score for the 249 students was the 61st percentile—meaning 61 percent of the institutional means were at or below the mean score for this group. Comparing scores in particular subject areas with the overall score reveal variation in performance by subject area. In quantitative analysis students scored at 91%, marketing at 70%, and economics at 69%, and their lowest scoring areas were in management at 44% and legal and social issues at 51%. Within subject areas the range of scores

by student concentration was even larger with four disciplines with a range in performance greater than 50%: accounting at 63% (91% - 28%), economics at 62% (95% - 33%), international issues at 57% (86% - 29%), and finance at 55% (83% - 28%).

Overall Test Score Performance by Student Concentrations

Using the entire data set (n = 249), single factor analysis of variance of the scores revealed highly significant differences among the concentration means of overall test scores (less than 1 percent). See Table 2. For example, the mean MFTB score for accounting students was 161, while the mean MFTB score for marketing students was 151. Tukey simultaneous comparison t-values show no significant differences between the accounting and economics means or among the general business, management, and marketing means. However there appear to be significant differences between the accounting and economics students and the other three concentrations at the 0.05 level. Given that all business students take the same business core courses, the variation in overall test scores by concentration could reflect various factors such as differences in student quality or differences in the effects of upper level concentration courses.

Table 2						
Single Factor ANOVA for Concentration Means with n = 249						
Groups	Count	Sum	Average	Variance		
Accounting	42	6769	161.17	152.19		
Economics	27	4369	161.81	118.54		
General business	54	8218	152.19	137.81		
Management	73	11189	153.27	160.29		
Marketing	53	8000	150.94	125.05		
ANOVA						
Source of Variation	SS	df	MS	F	P-value	F critical
Between Groups	4358.55	4	1089.64	7.67	7.77E-06	2.41
Within Groups	34669.41	244	142.09			
Total	39027.96	248				

Accounting and Economics Concentrations

A great deal of these cell differences in Table 1 can be explained by the fact that for the overall test score, the accounting and economics concentration students scored at a statistically significant higher level than did the other three majors. Accounting and economics majors scored 86% and 88% respectively, while the other three majors' overall scores ranged from 42% to 55%. There was only one subject area for only one concentration (management) where any of the other three majors scored higher (information systems at 76%) than the accounting and economics students. A great majority of management majors take an upper division course in information systems. In addition, the cell differences between accounting and economics majors

are very slight except for accounting majors scoring much higher in economics at 83% than economics majors scored in accounting at 59%. A significant majority of these accounting majors took international economics, while very few economics students took an upper division accounting course.

General Business, Management and Marketing Majors

For these other three majors, overall student quality helped to explain over sixty percent of these 27 subject area cell differences. For example, in terms of overall scores management majors were at 55%, general business majors at 47%, and marketing majors at 42%. And in the accounting subject area, management students scored 51%, general business students 32%, and marketing majors 28%. This pattern is repeated for finance, information systems, and international. Management majors scored higher than both general business and marketing majors in four out of nine of the disciplines, and higher than general business in two additional subject areas (management and marketing) and general business majors scored higher than marketing majors in five of seven disciplines with two subject area scores being identical. Course requirements also contributed to understanding some of these cell differences as with marketing majors scoring the highest in marketing for these three major student groups.

Marketing Majors

The marketing majors were the lowest scoring group of students in terms of overall performance. These students scored much higher than their overall score of 42% in only two subject areas, quantitative analysis at 74% and marketing at 71%. In marketing, they take a great deal of courses, and in quantitative analysis they had the lowest score of all five major student groups. There were four low scoring areas of interest for marketing majors: economics at 33%, international issues at 29%, accounting at 28%, and finance at 28%. Marketing concentration students take only the required core courses in economics, accounting and finance; additional courses in these areas are not required. This may partially explain their performance. Marketing majors are required to take international marketing as part of the marketing concentration requirements.

The faculty grading policy in international marketing might explain part of the reason for the low score (29%) for marketing majors in international issues. In Table 3 below, the grade comparisons for international economics and international marketing are presented for the most recent two years.

Table 3				
Grading Differences between International Courses				
Course	ABC	DFW	Total	% DFW
International Economics	150	77	227	34%
International Marketing	167	6	173	3%

In upper division courses, students must make an A, B or C in each course for it to count for graduation. If they make a D, F or withdraw (W), they are unsuccessful and must repeat the

course. The proportion of unsuccessful students (% DFW) differs significantly between the two courses. Testing the equality of two independent proportions (null hypothesis: proportion of DFW for international economics = proportion of DFW for international marketing) reveals the proportions are significantly different (z value of 7.44 with a p value much less than one percent). For these two courses, there is a statistically significant difference between the grade sets. The grading differences may show differences in expected student performance and mastery of material for the two courses. It is also possible the material in the international marketing course is not well-aligned with the MFTB.

General Business Majors

General business majors were the next lowest overall scoring group at 47%. These students are required to take at least one upper division course in addition to the business core in accounting, economics, management, marketing and international issues, but their scores in these subjects varied from 29% in international issues to 56% in economics (see Table 1).

It is possible that faculty grading policies might have contributed to this range of subject area scores for general business majors in four of the five areas. The grades for **all students taking the General Business** required economics course (Managerial Economics) and the required marketing course (Consumer Behavior) and the required management course (Management of Human Resources) and the international courses these students take most often (International Business Enterprise and International Marketing) from the two most recent academic years are presented below in Table 4.

Table 4					
Grading Differences in Upper Division Courses taken by General Business Students and their MFTB Subject Area Performance					
Course	ABC	DFW	Total	%DFW	General Business Student MFTB Area Score
Managerial Economics	123	28	151	18%	Economics - 56%
Consumer Behavior	127	26	153	17%	Marketing - 53%
Management of Human Resources	346	35	381	9%	Management - 32%
International Business Enterprise	87	4	91	4%	International Issues - 29%
International Marketing	167	6	173	3%	
Grouping for grading comparisons:					
	ABC	DFW	Total	% DFW	
Economics & Marketing	250	54	304	18%	
Management & International	600	45	645	7%	

In the required economics course and the required marketing course where the students scored above 50%, the recent grade results were significantly different from the grades in the required management course and the two courses in international issues that general business majors

typically choose between. Testing the equality of two independent proportions (null hypothesis: proportion of DFW for economics/marketing courses = proportion of DFW for management and international courses) reveals the proportions are significantly different (z value of 5.07 with a p value much less than 1 percent). In management and international issues, these students only scored 32% and 29% respectively. As was the case in Table 3, the faculty grade results in the management and international courses that general business majors take are higher and significantly different from the grades in these two economics and marketing courses. And student performance on the MFTB in economics and marketing was much better.

This relationship between lower grades and higher score performance did not apply to the accounting area for general business majors who are required to take cost accounting. These students scored only 32% in accounting, and the DFW% in cost accounting is rather high.

Management Majors

The management majors scored 55% overall on the MFTB, and five of their subject area scores were within 10% (+ or -) of this percentile: accounting at 51%, economics at 55%, finance at 45%, marketing at 65%, and international issues at 52%. As noted earlier, the information systems score at 76% is most likely because of additional upper division coursework in this area.

The most difficult cell to explain in Table 1 was the subject area score in management of 39% for management majors. This 39% score was even lower than the overall management score of 44% for all students, and this 39% score was the second lowest scoring area for all management majors. Like for accounting, economics and marketing majors, management majors take several upper division management courses above those required of all business majors. But the subject area scores of these other three majors within their respective fields were much better.

Accounting majors scored 91% in accounting, economics majors scored 95% in economics, and marketing majors scored 71% in marketing. And all students scored overall much better in these other three disciplines than the 44% score in management: accounting at 58%, economics at 69% and marketing at 70%. Even the weaker overall scoring marketing majors scored slightly higher in management at 42% than did the stronger overall scoring management majors with a 39% in management. In addition, these management majors scored much higher in marketing at 65%. The implication is that the upper level management courses are not enhancing performance of the management students in the management subject area.

One partial explanation for this low management score of 39% might be faculty grading policy. To illustrate, faculty grades for upper division, required economics and management courses for a recent academic year are presented in Table 5 in order to show statistically significant differences between these two groups of instructors.

Table 5					
Grading and MFTB Score Differences Between Required Upper Division Courses in Economics and Management					
	ABC	DFW	Total	% DFW	Student MFTB Area Score
Economics	173	57	230	25%	95%

Management	393	40	433	9%	39%
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Testing the equality of two independent proportions (null hypothesis: proportion of DFW for economics = proportion of DFW for management) reveals the proportions are significantly different (z value of 5.39 with a p value much less than 1 percent). In management where the %DFW is much lower, the MFTB area score is also much lower. The expected result is that better course performance would lead to better MFTB performance.

The management of human resources course might provide some additional insight as to the overall low score in management at 44%. Not only is this course required of all general business majors, but it is also required of all management majors. As illustrated above in Table 4, there were 381 grades for this course which was more than double any of the other courses listed, and the DFW% was only 9%. In addition, one-half of the sections of the management of human resources course were taught by non-doctoral faculty.

In order to adjust for the differential quality of overall student performance by student major discussed earlier, percentile differences are presented in Tables 6 and 7. The reader should remember that accounting and economics majors scored overall significantly better than management and marketing majors.

Table 6			
Management Percentile Differences by Student Concentration			
	Accounting students	Economics students	Management students
Management Subject Area	71%	73%	39%
Overall Score	86%	88%	55%
Percentile Difference	- 15%	-15%	- 16%

For all three of these major student groups, the students scored nearly the same in management compared to their overall scores, but nearly all of the management majors take at least four more management courses than accounting and economics majors. Taking additional management courses, however, did not seem to enhance management student management scores on the MFTB.

In Table 7, a similar presentation is made for marketing compared to accounting and economics.

Table 7			
Marketing Percentile Differences by Student Concentration			
	Accounting students	Economics students	Marketing students
Marketing Subject Area	78%	83%	71%
Overall Score	86%	88%	42%
Percentile Difference	- 8%	- 5%	+29%

In this case, the percentile differences are probably explained by the fact that the marketing majors take at least five more marketing courses than the accounting and economics majors. This is in contrast to the results for the management students (Table 6). In earlier research, Word, Rook, and Lancaster (2011) found the %DFW rate for all upper level courses in marketing was the same as for upper level courses in management (8%).

Summary and Conclusion

For the score results presented above, one can explain the great majority of the cell differences based on three factors: (1) overall student quality, (2) course work completed in each subject area, and (3) faculty grading differentials.

At this school, overall student quality appeared to be the most important factor in explaining MFTB results. General business, management or marketing majors scored higher than accounting and economics majors in only one subject area (information systems). Management majors scored higher than general business and marketing in four subject areas and management students scored higher than general business students in two additional areas. Thus management majors scored better than general business or marketing in two-thirds of the subject areas.

Course work completed in each subject area and faculty grading differentials also appeared to help to explain several scoring differences. Requiring an upper division course where the faculty grading policy produces a higher %DFW usually produces higher MFTB results in the subject areas.

The major subject area that could not be fully explained by these three factors was the very low performance of management majors in management, especially when compared to the relatively high performance of marketing majors in marketing. After adjusting for the differential quality of overall student performance by student major, these different results occurred despite the fact that the faculty grading results in upper level management and marketing courses were very similar, and each major required several upper division courses in field. It is quite possible that the lack of alignment of the upper division required management curriculum with the MFTB and/or faculty deployment could have significantly contributed to this management subject area result. Additional management courses taken by management concentration students do not seem to improve MFTB performance in management. This suggests the course design of additional management upper level coursework is not reinforcing concepts on the MFTB. Alternatively, the course execution of additional management upper level course work could be the problem (faculty deployment).

The use of the subject area scores by student concentrations provides a wealth of information for assessment analysis. In response to the MFTB analysis, the curriculum has changed and there have been faculty discussions concerning grading policies and course content. Though the results will vary by business school, this research is presented as an approach for schools to use to enhance the assessment process and improve student learning.

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