
BUSINESS PROGRAM CAPSTONE RESULTS IN ECONOMICS

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ABSTRACT

This paper examines the determinants of performance on an internal version of the business major field achievement capstone exam given to undergraduate students. The focus was on performance by economics students regarding various business disciplines versus the performance of different majors on questions about economics. The sample consists of 812 students, including 54 economics majors, at a midsized regional institution located in the Southwestern region of the United States. The empirical model employed is a nonparametric Kruskal-Wallis test. Results of the study show economics and accounting majors perform the best on the economics component of the capstone exam, with marketing majors scoring the lowest. Overall performance of economics students on the capstone exam indicates that business law was their highest performance discipline, international business as the second strongest area, and a three-way tie between economics, finance, and management for the third-highest performance grouping. **JEL Classification:** A22, I23

INTRODUCTION

Program assessment is a critical explicit requirement of all accredited academic programs in modern day higher education. One standard tool for an undergraduate business program is a capstone exam, which offers an assessment of student performance on foundational concepts across multiple business disciplines. An example of an external capstone exam is the widely used Educational Testing Service's (ETS) exam in business. Standardized exams offer a convenient tool for benchmarking a student group's general knowledge compared to students at other schools. According to Hahn and Leslie (2017), the ETS exam is employed by over 40% of business schools accredited by the Association to Advance Collegiate Schools of Business (AACSB). An alternative to employing the multiple-choice ETS exam is the creation of an internal capstone equivalent. Business schools creating an internal capstone exam as an alternative normally utilize questions created by program faculty aligned to the learning objectives. An internal capstone exam is easier to administer and does not incur the expense of using external content, but does not

offer benchmarking opportunities. However, if faculty teach to the exam instead of program goals, benchmarking may not be relevant.

The purpose of this paper is to analyze the determinants of performance on an internal version of the business major field achievement capstone exam given to undergraduate students, with a focus on performance by economics students in various business disciplines versus performance of different majors on the economics component. The results of this study are derived from a public university located in the Southwestern part of the United States. The institution is mid-sized with a total enrollment of approximately 10,000 total students, 1,350 undergraduate business students, and 1,500 graduate business students.

This manuscript is organized as follows: First, a literature review offers highlights from previous capstone business exam studies. The second section presents data and model information. The third section is a discussion of empirical results and implications. The final section includes research conclusions, limitations, and extensions.

LITERATURE REVIEW

A vast amount of research exists on the determinants of student performance on the ETS exam. Mirchandani, Lynch, and Hamilton (2001) find two types of variables are related to student performance on the ETS exam: input variables (SAT scores, transfer GPA, and gender) and process variables (grades in quantitative courses). They conclude that the SAT score is a dominant variable explaining most of the variation in ETS exam scores, although other variables, including GPA and gender, are also statistically significant. Black and Duhon (2003) employ a large sample of 297 students to determine student performance on the ETS exam. Their regression model reveals that GPA, ACT score, gender, and major are significant determinants of performance on the ETS exam. Bagamery, Lasik, and Nixon (2005) find gender, whether students took the SAT, and grades to be significant determinants of the ETS exam, while location, age, transfer status, and major are not significant. Bycio and Allen (2007) contribute to the literature by showing that, in addition to GPA and SAT score, student motivation is an important determinant of performance on the ETS exam.

Course formats in business schools today are varied and frequently driven by both student demand and the desire of schools to use resources in efficient ways as well as to attract students from broader areas. The nature of course format could impact capstone exam scores if one instruction mode is inherently inferior to another. Three frequently used course formats include traditional campus courses, online courses, and newer hybrid courses. Hybrid courses use a mode of instruction that combines some of the inherent features of online (e.g., time independence) and campus (e.g., personal interaction) environments (Terry, 2007). Brown and Corkill (2007) indicate that almost two-thirds of colleges and universities that offer face-to-face courses also are providing graduate courses via the online environment. Online course offerings in postsecondary schools are ubiquitous in modern higher education. Postsecondary institutions offering online courses include both traditional institutions and institutions founded to provide only online courses. Jeff Seaman, chief information officer and survey director of the Sloan Consortium states, "There were nearly 3.2 million

students taking at least one course online this past fall, up from 2.3 million just last year.” (Allen & Seaman, 2007). By 2014, over 25% of college students took at least one online class (National Center for Education Statistics, 2014). As the numbers of students enrolled in online instruction have increased, researchers have debated the effectiveness of online instruction (Bowman, 2003; Fann & Lewis, 2001; Fortune, Shifflett & Sibley, 2006; Lezberg, 1998; Okula, 1999; Terry, 2000; Worley & Dyrud, 2003). The federal government has driven interest in the effectiveness of online instruction as a component of overall program assessment through the requirements of regional accrediting agencies and international accreditation associations for schools of business (Kelchen, 2017).

All collegiate business programs are tasked with the ongoing need for assessment (Bagamery, Lasik & Nixon, 2005; Martell & Calderon, 2005; Trapnell, 2005; AACSB, 2019). Traditionally, accrediting bodies were focusing primarily on input measures (Peach, Mukherjee & Hornyak, 2007). Input measures could reflect characteristics of the students who attended the business program (Mirchandani, Lynch & Hamilton, 2001) or organizational factors such as the institution’s reputation, faculty-student ratio, or the number of faculty with terminal degrees (Peach, Mukherjee & Hornyak, 2007). Mumford and Ohland (2011) study several input factors and find consistent results including that economics students who switched into economics from STEM majors do not outperform other economics majors, indicating that math skills alone are not the overriding success factor for economics. For collegiate business programs aspiring to meet or maintain the standards of accreditation established by AACSB, it is required they have program learning goals and to directly measure student achievement of these goals (Martell, 2007; Pringle & Michel, 2007). There is evidence that alternatives to the major field ETS exam can be effective assessment tools (Hahn & Leslie, 2017; Chowdhury & Wheeling, 2013; Greene, Stone & Zegeye, 2014).

DATA AND MODEL

The Kruskal-Wallis test is designed to be sensitive against differences among means in the k populations and is extremely useful when the alternative hypothesis is that the k populations do not have identical means. The Kruskal-Wallis test is used in this study to test the null hypothesis that the k capstone exam performance in economics by various majors and by economics majors across various disciplines are derived from an identical distribution function. For a complete description of the Kruskal-Wallis test, see Conover (1980). The specific equations used in the calculations are as follows:

- (1) $N = \sum_i n_i$ with $i = 1$ to k
- (2) $R_i = \sum_j R(X_{ij})$ with $j = 1$ to n_i
- (3) $R_i = \sum_j O_{ij} R_j$ with $i = 1$ to c
- (4) $S^2 = [I/(N-I)] [\sum_i t_i R_i^2 - N(N+I)^2/4]$ with $i = 1$ to c
- (5) $T = (I/S^2) [\sum_i (R_i^2/n_i) - N(N+I)^2/4]$ with $i = 1$ to k
- (6) $|(R_i/n_i) - (R_j/n_j)| > t_{1-\alpha/2} [S^2(N-I-T)/(N-k)]^{1/2} [(I/n_i) + (I/n_j)]^{1/2}$

where R is defined as the variable rank and N is the total number of observations. The first three equations find average ranks. Equation (4) calculates the sample variance,

while equation (5) represents the test statistic. If, and only if, the null hypothesis is rejected, equation (6) is employed to determine multiple comparisons of performance on the capstone exam.

The source of capstone exam result information is from the assessment office in a business school at a midsized regional institution located in the Southwestern region of the United States. The business program is accredited by AACSB and enrolls approximately 1,350 business and economics majors at the undergraduate level. The program employs an internal capstone exam, with a platform organization consistent with the Business Major Field ETS exam but modified by faculty with questions better aligned with program learning objectives. The capstone exam is given to seniors completing a spring campus strategic management course, with scores on the exam accounting for at least 10% of the final course grade. The sample consists of 10 years of capstone exam results, with only minor assurance of learning revisions made to the exam over the longitudinal time horizon. There is a total of 812 usable observations in the sample, 54 observations from economics majors with 758 from other business majors. University academic records are the source of admission and demographic information to correct for the potential biases identified in self-reported data (Maxwell & Lopus, 1994). Sample demographics include an average age of 24, 46% female, 5% African American, 27% Hispanic, 2% international, 21% part-time student, 52% transferring at least 60 credit hours, and 66% completing at least 15 credit hours via online instruction. The economics program includes eight full-time doctorate faculty members, and the business program includes 62 full-time faculty members.

RESULTS

Do economics majors perform better on the economics component of a senior capstone exam than other majors? In addition to the economics discipline, how do economics majors perform across other business disciplines on a senior capstone exam? Theoretically, we anticipate economics majors to earn scores that are relatively high across multiple business disciplines, given economics is a foundation for all business areas. In this section, we focus on performance by economics students in various business disciplines versus performance of different majors in economics. The statistical methodology incorporates a nonparametric approach to comparing performance by economics majors and within the economics component of the senior capstone exam. The Kruskal-Wallis test is employed because it offers the most powerful test statistic in a completely randomized design without assuming a normal distribution. The empirical approach yields t-values that are statistically significant (p -value = .0001), indicating a difference in both capstone performance in the economics discipline and by economics majors across various disciplines.

Table 1 presents a summary of the average nominal scores, average rank value, and statistical grouping of capstone exam scores for economics majors by academic area. Assuming an alpha level of .05, the empirical results from equation 6 indicate economics majors have five statistically different outcomes across the nine academic disciplines in the study. The statistically highest performance area for economics major is business law, with a nominal score of 88% and a rank value of 21.78. In general, pursuing law school is a common path for economics majors. Specific to the host institution for the study, the program offers a law and economics track within the

major. Hence, the high score for economics majors in the business law discipline is not a surprise for this explicit sample.

The second-highest score for economics majors is in the area of international business, with a nominal score of 82% and a rank value of 31.06. International business and ethics are two core mission areas for the business school that is part of the study. International business concepts are introduced and applied as an integral part of various courses throughout the curriculum for all majors, including economics majors. Institutions that do not have an explicit focus on international business may not replicate this result.

The third grouping of scores for economics majors includes the disciplines of economics, management, and finance. Scores in the third group range from a high of 79% in economics (rank value of 36.67) to 75% in finance (rank value of 40.82). Statistically equivalent scores in economics and finance is not a surprise for economics majors, but the inclusion of management in the same grouping was not anticipated. In general, economics majors tend to be relatively strong with respect to the mathematical and critical thinking applications consistent with the economics and finance disciplines. In contrast, management tends to employ organizational behavior and applied psychology. The increasing popularity of behavioral economics combined with the established area of labor economics creates a bridge for economics majors into the management discipline. For the study, the academic program of the host institution consistently offered both behavioral and labor economics courses.

The fourth grouping of scores includes marketing, accounting, and statistics. Scores in the fourth group narrowly range from a high of 70% in marketing (rank value of 46.72) to 69% in statistics (rank value of 48.83). In general, scores at the 70% level are still relatively high even though the fourth grouping is much lower than business law or international business. Economics majors tend to have higher scores relative to other business majors across the majority of disciplines. For example, the fourth grouping in economics is approximately 9% higher than an equivalent for an alternative discipline such as marketing. Concepts in accounting (e.g., fixed costs and variable costs), marketing (e.g., price elasticity of demand), and statistics (e.g., regression analysis) are omnipresent foundation concepts in economics. The lowest discipline scores for economics majors in the study are in computer information systems, which includes a nominal score of 62% and a rank value of 57.67. In general, computer applications are employed by economics majors, but management information systems concepts are not integrated into an economics curriculum relative to business law, finance, management, accounting, and related disciplines. The notion of creative destruction is part of economic theory and applicable to the modern information technology sector. Of course, senior capstone questions in the computer information systems disciplines are not usually correlated with creative destruction theory. Basic programming, web design, and information security concepts that are part of computer/management information systems curriculum are not generally part of an economics program.

Table 2 presents a summary of the average nominal scores, average rank value, and statistical grouping of capstone exam scores for various business majors on the economics component of the senior capstone exam. Assuming an alpha level of .05, the empirical results from equation 6 indicate business majors have three statistically different outcome groupings when exam results focus on the economics discipline. Economics and accounting are the statistically highest performance majors on

the economics component of the capstone exam, with a nominal score of range of 77% (rank value of 23.52) to 79% (rank value of 21.28). The observation that the economics majors earn the highest score on the economics capstone is anticipated. In general, there is an expectation that all majors will earn higher scores than alternative majors on capstone exam content explicitly tied to one's own major. Accounting majors earning a statistically equivalent score is a bit of a surprise, although there is enough correlation in economics and accounting foundation concepts to make the results explicable. In fact, one could extrapolate that many accounting majors tend to enjoy economics courses beyond the required basics. Accounting students learn a substantial amount of new terminology beyond just debits and credits as they progress through their major. Thus, learning the nomenclature of economics of first the theory and then quantifying the concepts is not overwhelming.

The second performance grouping on the economics capstone exam includes finance, computer information systems, management, and general business majors. Nominal scores for the second grouping are at 71% (rank value of 30.72) to 72% (rank value of 34.45) range. The most interesting observation associated with the second grouping is that finance majors earned scores that are statistically equivalent to management, computer information systems, and general business majors. Ex ante, one would anticipate finance majors performing at a level closer to economics and accounting majors on the economics component of a business capstone exam. One change in the finance discipline in recent years is the growth of personal financial planning concepts within the major. Traditional corporate finance may be more aligned with economic concepts than is personal financial planning. Alternatively, it is also possible that the type of student attracted to a finance major has changed over time as the influence of personal financial planning has increasingly crowded out some aspects of the traditional finance curriculum. Marketing majors represent the third and final grouping, which includes a nominal score of 66% and a rank value of 46.33. Marketing majors being the lowest performer on the economics capstone exam cannot be explained by curriculum correlation. In general, many of the concepts in marketing are founded on ideas related to shifting demand curves or seeking ways to make product price elasticity of demand more inelastic. A more likely explanation is a tendency for marketing majors to be more interested in human reactions to the senses (touch, sight, hearing, taste, and smell) within a business context application, while economics courses are more in the domain of critical thinking and analytics. In general, the results imply marketing majors may have a strong interest in a few important economic concepts but struggle when the concepts broaden to a wide array of economic issues.

CONCLUSION

This study examines student performance on a business capstone exam with a focus on the economics discipline. Data collected over ten years provides evidence that content areas such as business law, international business, economics, and finance are relatively high-performance areas for economics majors. In contrast, economics majors were found to score relatively low in the computer information systems component of a capstone exam. The most logical explanation for the lower score in computer information systems is a lack of foundational computer information systems

content in an economics curriculum. The second area of exploration is performance on the economics component of the capstone exam by various majors. As expected, economics majors earned the highest score on the economics component of the capstone exam. Accounting majors also did very well on the economics capstone, earning a score slightly lower but statistically equivalent to that of economics majors. The most surprising result is the relatively poor performance of marketing majors on the economics capstone. Marketing majors clearly scored lower than any other academic area, with a nominal score of 66% correct. The result implies marketing majors struggle, relative to other business majors, when the concepts broaden to a wide array of economic issues.

The study is not without limitations. First, only one university served as the study host, which may limit the ability to generalize results to other institutions. Second, the capstone exam in the study is an internal exam created to implicitly replicate the ETS Business Major Field Exam but is not explicitly the same as the ETS offering. Program faculty prefer to offer a capstone exam more closely aligned to learning objectives to assess results more efficiently. An internal capstone might make sense for an individual program, but further complicates the ability to generalize results to other institutions. Third, the study and data collection were conducted over ten years. Ten years of data helps provide a robust sample, but slight modifications to the capstone exam over time could create a modest confounding effect. Fourth, the study employs a nonparametric empirical tool, which can provide efficient estimates but may not offer control variables consistent with regression methods preferred by some scholars. Opportunities for future research include the prospect of multiple institutions jointly agreeing on a capstone instrument and replicating the study. Multiple results from this study might be specific to the host institution. Collaboration with other institutions will help control for nuances that may only be germane at a specific program. A second avenue for future research is to compare capstone results from a campus versus online capstone class. All the students in this study enrolled in a campus capstone class, but increasingly, more students are completing said capstone course via the online equivalent.

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TABLE 1
Economics Major's Score on Capstone Exam by Academic Area (n = 54)

<i>Variable</i>	<i>Average Score</i>	<i>Average Rank</i>	<i>Average Rank Grouping</i>
Business Law	88%	24.11*****	Group 1
International Business	82%	31.06****	Group 2
Economics	79%	36.67***	Group 3
Management	76%	38.50***	Group 3
Finance	75%	40.82***	Group 3
Marketing	70%	46.72**	Group 4
Accounting	70%	48.59**	Group 4
Business Statistics	69%	48.83**	Group 4
Computer Information Systems	62%	57.67*	Group 5

Notes:

- (1) ***** Group 1 – Statistically significant highest average rank score classification.
- (2) **** Group 2 – Statistically significant second highest average rank score classification.
- (3) *** Group 3 – Statistically significant third highest average rank score classification.
- (4) ** Group 4 – Statistically significant fourth highest average rank score classification.
- (5) * Group 5 – Statistically significant lowest average rank score classification.

TABLE 2
Score on Economics Component of Capstone Exam by Major (n = 812)

<i>Variable</i>	<i>Average Score</i>	<i>Average Rank</i>	<i>Average Rank Grouping</i>
Economics	79%	21.28***	Group 1
Accounting	77%	23.52***	Group 1
Computer Information Systems	72%	30.72**	Group 2
Finance	72%	30.83**	Group 2
Management	71%	33.94**	Group 2
Business Law	71%	34.45**	Group 2
Marketing	66%	46.33*	Group 3

Notes:

- (1) *** *Group 1 – Statistically significant highest average rank score classification.*
- (2) ** *Group 2 – Statistically significant second highest average rank score classification.*
- (3) * *Group 3 – Statistically significant lowest average rank score classification.*

