The Determinants of Student Performance on the Business Major Field ETS Exam: Do Community College Transfer Students Make the Grade?

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ABSTRACT

This paper examines the determinants of performance on the business major field achievement ETS exam with a focus on the impact of students completing foundation courses at a two-year community college versus a four-year university. The sample consists of 174 students at a midsized regional institution located in the Southwestern region of the United States. The empirical model employed controls for grade point average, standardized test scores (SAT/ACT), online courses, gender, and student motivation. Effort, ability and incentive variables are positive and statistically significant. The results indicate that students transferring thirty or more hours from a community college scored slightly higher on the ETS exam, although the results are not statistically significant.

INTRODUCTION

Assessment is an explicit obligation of modern academic programs. The Educational Testing Service’s (ETS) exam in business is an external standardized measure of assessment widely used to assess undergraduate business programs. Standardized exams like the ETS business exam offers a convenient tool for benchmarking student general knowledge compared to students at other schools. Evidence supporting the correlation between ETS scores and a student’s actual business knowledge is limited but is widely employed as a tool for analysis. The purpose of this paper is to evaluate the determinants of student performance on the ETS major field achievement exam with a focus on students transferring thirty or more credit hours from a community college. With the cost of higher education significantly increasing throughout the last decade, many students are taking advantage of more affordable options at a community college for the first two years of a college education. The research cohort for this study is a public university located in the Southwestern part of the United States. The institution is mid-sized with a total enrollment of approximately 7,500 total students, 1,000 undergraduate business students, and 350 graduate business students.

The organization of the manuscript is as follows: First, a brief literature review is provided. The second section of the manuscript describes the data and model. The next section offers empirical results for the determinants of performance on the ETS exam. The final section offers conclusions and discusses the limitations of the study.
LITERATURE REVIEW

A vast amount of research exists on the determinants of student performance on the ETS exam. Mirchandani, Lynch, and Hamilton (2001) find that 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 scores, student motivation is an important determinant of performance on the ETS exam.

Three frequently used course formats include the traditional campus courses, online courses, and newer hybrid courses. 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 influence ETS scores if one instruction mode is inherently inferior to another. Hybrid courses are taught using 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).

Online course offerings in postsecondary schools are growing rapidly. Postsecondary institutions offering online courses include both traditional institutions and institutions founded to offer only online courses. An example of a postsecondary institution founded to offer only online courses is Capella University. Founded in 1993, Capella currently has over 19,900 adult learners enrolled in online courses. According to the U.S. Department of Education, 90 percent of degree-granting postsecondary institutions offered asynchronous Internet courses in 2001 (National Center for Education Statistics, 2001). Both the numbers of postsecondary schools offering online courses and the numbers of students enrolling in online courses are increasing. 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). 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. Terry, Mills, Rosa, and Sollosy (2009) determine that students completing multiple business courses online score approximately six percent lower on the ETS exam.

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 shown interest in the effectiveness of online instruction as a component of overall program effectiveness. While the need for assessment is not new, the focus of assessment as illustrated by the Association to Advance Collegiate Schools of Business (AACSB) International has clearly intensified (Pringle & Michel, 2007).

All accredited collegiate business programs seek continuous improvement and program assessment (Bagamery, Lasik & Nixon, 2005; Martell & Calderon, 2005; Trapnell, 2005). 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 number of faculty with terminal degrees (Peach, Mukherjee & Hornyak, 2007). Collegiate business programs aspiring to meet or maintain the standards of accreditation established by AACSB are required to have program learning goals and utilize direct measures that reflect student demonstration of achievement of these goals (Martell, 2007; Pringle & Michel, 2007). As schools of business have developed and rapidly expanded their online course enrollments, assuring that student learning in the online format is at least equivalent to the level of learning taking place in traditional classroom courses could be a useful component of meeting assessment requirements.

DATA AND MODEL

The purpose of this section is to develop an empirical model that can test student performance on the ETS exam. Davisson and Bonello (1976) propose an empirical research taxonomy in which they specify the categories of inputs for the production function of learning. These categories are human capital (admission exam score, GPA, discipline major), utilization rate (study time), and technology (lectures, classroom demonstrations). Using this taxonomy, Becker (1983) demonstrates that a simple production function can be generated which may be reduced to an estimable equation. While his model is somewhat simplistic, it has the advantage of being both parsimonious and testable. A number of problems may arise from this research approach (Chizmar & Spencer, 1980; Becker, 1983). Among these are errors in measurement and multicollinearity associated with demographic data. Despite these potential problems, there must be some starting point for empirical research into the process by which there is evidence of business knowledge learning.

The choice as to what demographic variables to include in the model presents several difficulties. A parsimonious model is specified in order to avoid potential multicollinearity problems. While other authors have found a significant relationship between race or age and learning (Siegfried & Fels, 1979; Hirschfeld, Moore, & Brown, 1995), the terms are not significant in this study. A number of specifications are considered using race, age, work experience, and concurrent hours in various combinations. Inclusion of these variables into the model affected the standard errors of the coefficients but not the value of the remaining coefficients. For this reason, they are not included in the model. University academic records are the source of admission and demographic information because of the potential biases identified in self-reported data (Maxwell & Lopus, 1994).

The model developed to analyze student learning relies on a production view of student learning. Assume that the production function of learning business concepts via the ETS exam can be represented by a production function of the form:

\[ Y_i = f(A_i, E_i, D_i, X_i), \]

where \( Y \) measures the degree to which a student learns, \( A \) is information about the student’s native ability, \( E \) is information about the student’s effort, \( D \) is a \([0, 1]\) dummy variable indicating demonstration method or mode, and \( X \) is a vector of demographic information. As noted above, this can reduce into an estimable equation. The specific model used in this study is:

\[ \text{SCORE}_i = B_0 + B_1\text{ABILITY}_i + B_2\text{GPA}_i + B_3\text{NET}_i + B_4\text{TRANSFER}_i + B_5\text{FOREIGN}_i + B_6\text{GENDER}_i + B_7\text{GR10}_i + B_8\text{GR20}_i + u_i. \]

The dependent variable used in measuring effectiveness of student performance is percentile score (SCORE) on the ETS exam. Table 1 presents the descriptive statistics of all variables employed in the
model. Senior students in the undergraduate capstone strategic management course complete the ETS exam as a formal class requirement. The mean percentile score for the research cohort is the 52.33 percentile with a standard deviation of 34.08. The ETS score at a mean of approximately the 50th percentile combined with a large standard deviation of both very good and relatively poor student performances yields a research cohort that is very representative of a typical regional college of business program.

Table 1: Summary Statistics

<table>
<thead>
<tr>
<th>Variable</th>
<th>Mean</th>
<th>Std. Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>SCORE</td>
<td>52.33</td>
<td>34.08</td>
</tr>
<tr>
<td>ABILITY</td>
<td>21.01</td>
<td>4.26</td>
</tr>
<tr>
<td>GPA</td>
<td>2.72</td>
<td>0.53</td>
</tr>
<tr>
<td>NET</td>
<td>0.43</td>
<td>0.49</td>
</tr>
<tr>
<td>TRANSFER</td>
<td>0.32</td>
<td>0.37</td>
</tr>
<tr>
<td>FOREIGN</td>
<td>0.08</td>
<td>0.27</td>
</tr>
<tr>
<td>GENDER</td>
<td>0.50</td>
<td>0.50</td>
</tr>
<tr>
<td>GR10</td>
<td>0.17</td>
<td>0.40</td>
</tr>
<tr>
<td>GR20</td>
<td>0.20</td>
<td>0.41</td>
</tr>
</tbody>
</table>

Notes: n = 96.

The ACT entrance exam or SAT converted to ACT equivalency measures student’s academic ability (ABILITY). The average ACT score for the research cohort is 21.02 (equivalent to 1020 on the math/reading SAT or 1550 on the 2400-point SAT). The ABILITY variable via the ACT exam is used as a proxy of student innate ability before entering the university. Student ability as measured by the ACT exam is expected to have a positive impact on ETS score.

Grade point average (GPA) is included in the model based on previous research indicating that grade point average is one of the primary positive determinants of student performance on the ETS exam. Student grade point average in the study for the cohort is 2.72 with a standard deviation of approximately half a grade point at 0.53.

The categorical variable NET represents student enrollment in more than one online business course during the academic program before taking the ETS exam. The business program in the research study does not offer a complete undergraduate business degree online during the time of the study but did offer ad hoc courses via the online instruction mode. Forty-three percent of the students in the research cohort completed multiple business courses via online instruction. The NET variable is expected to have a negative impact on ETS scores given the online environment is still developing as an instructional mode relative to the traditional chalk and talk of the classroom.

The variable TRANSFER is included in the model as a demographic variable controlling for students that complete thirty or more hours at a two-year community college. Community college transfer students represent over thirty percent of the students in the research cohort. The transfer variable is expected to have a negative impact on ETS score as business core classes in economics, accounting, and business law at a community college are not expected to meet the rigor of the courses at a four-year university.

The demographic variable FOREIGN is included in the study to separate international students from domestic students. International students are often recruited to diversify the campus environment and raise the level of academic standards via performance on standardized entrance examinations like the ACT or SAT. International students often face unique language, psychic, and cultural challenges that
might negate some of their innate ability and work ethic. Foreign student classification is approximately eight percent of the research cohort.

The variable GENDER is included in the model based on the finding of previous researchers (Bagamery, Lasik & Nixon, 2005; Black and Duhon, 2003; Mirchandani, Lynch & Hamilton, 2001) that male student performance on the ETS exam is higher than female. Males and females evenly divide the research cohort for this study.

The model includes the two student motivation variables, GR10 and GR20, where GR10 represents the case where percentage score on the ETS exam counts ten percent of the course grade in the business capstone course and GR20 applies percentage score on the ETS exam to twenty percent of the capstone course grade. The effort to tie student performance on the ETS grade as a motivator is consistent with Allen and Bycio (1997), but adds the wrinkle of comparing multiple levels of grading application at both the ten and twenty percent levels. Bycio and Allen (2007) provide nominal evidence that student motivation is an important determinant of performance on the ETS exam but their measure is based on a 4-point scale employing self-reported data without including a test group versus control group for a course grade application. One weakness of employing a capstone course grade as a motivator is the limited impact it can actually have on a student given that most senior business students are approaching 120 credit hours and one single course does not have a big impact on overall GPA.

RESULTS

Results from the ordinary least squares estimation of equation (2) are presented in this section and Table 2. The sample cohort is derived from students taking the ETS exam from 2003-2009. The total usable sample size is 174, with 88 students eliminated from the global sample of 262 because of incomplete information, usually relating to the lack of ACT/SAT scores (Douglas & Joseph, 1995). None of the independent variables in the model have a correlation higher than .65, providing evidence that the model specification does not suffer from excessive multicollinearity. The equation (2) model explains over 48 percent of the variance in performance on the ETS exam. Five of the eight independent variables in the model are statistically significant.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>t-statistic</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercept</td>
<td>-79.403</td>
<td>-4.48</td>
</tr>
<tr>
<td>ABILITY</td>
<td>3.971</td>
<td>4.91*</td>
</tr>
<tr>
<td>GPA</td>
<td>18.126</td>
<td>3.19*</td>
</tr>
<tr>
<td>NET</td>
<td>-6.001</td>
<td>-1.30</td>
</tr>
<tr>
<td>TRANSFER</td>
<td>0.973</td>
<td>0.67</td>
</tr>
<tr>
<td>FOREIGN</td>
<td>5.012</td>
<td>1.99*</td>
</tr>
<tr>
<td>GENDER</td>
<td>-0.271</td>
<td>-0.07</td>
</tr>
<tr>
<td>GR10</td>
<td>12.021</td>
<td>2.59*</td>
</tr>
<tr>
<td>GR20</td>
<td>16.173</td>
<td>3.18*</td>
</tr>
</tbody>
</table>

Notes: R-square = .4862, F = 23.86, *p<.05, and n = 174.

Two of the statistically significant variables are ABILITY and GPA. The empirical results imply that student score on the ETS exam are directly related to academic ability measured by the ACT college entrance exam and academic performance measured by college grade point average. The statistically significant impact of standardized entrance exam scores and grade point average is consistent with
previous research. The significance of the ABILITY variable could simply be based on the observation that students with innate academic ability for standardized exams perform at a relatively high level on the ETS exam. The results relating to the ACT exam are somewhat tempered by the observation that 33 percent of the students in the initial sample were eliminated primarily for not having an official ACT/SAT score posted with the university. The positive and significant impact of GPA on ETS exam score is anticipated, as students with high grades are more likely to learn and retain core business information than students with a relatively low grade point average. Consistent with Mirchandani et al. (2001), overall GPA has a strong internal validity and provides a measure of student performance related to the curriculum of the school.

One of the more interesting results from the study revolves around the variable NET. Holding constant ability, grades, student motivation, and demographic considerations, students completing multiple business courses via the Internet (NET) format scored six percent lower on the ETS exam but the result is not statistically significant (t-stat of -1.30). The insignificant statistical result implies the online instruction mode produces a learning environment that is fairly equivalent to the traditional campus environment. Recent advances in online instruction tools that make it relatively easy to utilize streaming video, narrated graphic illustrations, and related communication instruments have narrowed the quality gap between the campus and online learning environments. It is worth noting that the lowest ETS scores for students in the online mode were observed in the first four years of the data set, providing anecdotal evidence for the hypothesis that recent technological advances have improved the quality of the online learning environment.

The TRANSFER variable yielded a surprisingly positive coefficient but the variable is not statistically significant (t-stat of 0.67). There appears to be little difference in performance on the ETS exam for community college transfer students versus students completing foundation academic work at a four-year university. The result implies, that controlling for factors like effort and ability, there is no statistical difference on capstone performance regardless of if a student completed thirty or more hours at a community college. This result is somewhat surprising given the general stereotype that students starting at a community college receive an inferior education. One possible explanation for the insignificant statistical sign on the community college transfer student variable is the potential survivor bias created by only the best and brightest students from the community college environment ever making it to the final stages of earning an undergraduate degree in business and taking a capstone exam like the ETS. It is possible the attrition rate of community college students is higher than the attrition rate of students starting at a comprehensive four-year institution but the overall academic knowledge of a student earning a business degree is similar at the end of a program regardless of where a student started college.

The demographic variable controlling for foreign student performance is positive and statistically significant, with international students scoring five percentile points higher on the ETS exam than domestic students. The public institution employed in the research offers out-of-state tuition waivers for students that demonstrate high academic ability, which significantly lowers tuition and fees. The out-of-state tuition waiver tends to attract international students with greater ability to perform on standardized exams than domestic peers. The GENDER coefficient associated with males is negative but highly insignificant. Unlike previous research, the results of this study do not find any evidence of a gender differential with respect to performance on the ETS exam.

The two student motivation variables are both positive and statistically significant. The results provide evidence that students are motivated to study and put forth effort on the ETS exam when scores are applied to the capstone course grade. A ten percent application to course grade results in a 12.02
increase in the ETS percentile score and a twenty percent application to course grade results in a 16.17 percentile score increase. The results clearly indicate a significant student response to the grade motivator but might be unique to this research cohort based on the middling mean ETS score and large standard deviation. It is a mathematical improbability that a research cohort comprised of students with average ETS scores well above the 50th percentile would have an equivalent result. The positive and significant result is primarily applicable to programs that struggle at or below the 50th percentile on the ETS exam and need to employ a tangible incentive in order to get students to explicitly put forth a significant and serious effort on the ETS exam instead of simply treating it as a required task with little or no direct benefits or penalties (Allen & Bycio, 1997). The results also imply that a ten percent grade incentive is strong enough to motivate students to put forth significant effort, although the twenty percent grade incentive does yield a coefficient that is four percentile points larger. The determination of a ten or twenty percent grade motivator should probably be at the discretion of the course instructor for the capstone course given that both are significant.

CONCLUSION

This study examines the determinants of student performance on the ETS business exam at a regional university. Consistent with previous research, the results find that academic ability measured by the college entrance exam and student grade point average are the primary determinants of student performance on the ETS exam. The empirical results indicate that counting performance on the ETS in a range of ten to twenty percent as part of the capstone course grade significantly increases performance on the ETS exam. International student classification also appears to be a positive determinant of ETS exam performance. Gender, community college transfer student status and completing courses online do not have a statistically significant impact on student ETS exam performance. The statistically insignificant result associated with the community college transfer student is particularly interesting given the increasing cost differential between two and four year institutions. Controlling for effort and innate ability it is possible that completing thirty or more hours at a community college will result in the same core business knowledge as a student from a four-year university. One significant limitation of the research is that one academic institution is the source of all data. A more robust sample of multiple institutions should be a focus of future research endeavors in order to verify the consistency of the empirical results.

REFERENCES


