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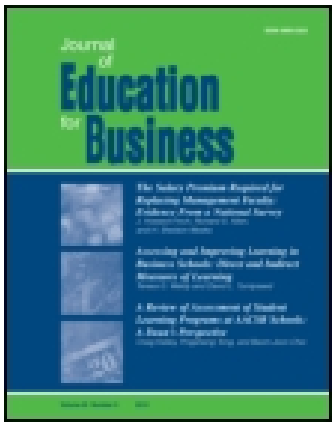

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The Importance of English Language Competency in the Academic Success of International Accounting Students

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The Importance of English Language Competency in the Academic Success of International Accounting Students

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The authors investigate the information content of two commonly used admission tests, namely the Graduate Management Admission Test and the Test of English as a Foreign Language (TOEFL). The analysis extends prior research by investigating the incremental information content of individual components from one admission test conditional on the information contained in the other admission test and undergraduate grade point average. The results suggest that for international applicants in master of accountancy programs, the TOEFL test is the only one that yields statistically significant incremental information content about academic success. If admissions officers were to eliminate one of the tests, it should not be the TOEFL.

Keywords: academic success, admission tests, information content, international accounting students, skills assessment

Enrollments in accounting bachelor and master degree programs continue to increase as documented in a recent American Institute of Certified Public Accountants survey (Moore, Mahler, & Ashton, 2011). The results indicate that students in accounting bachelor programs grew by 3.6% over a two-year period, but the explosive growth—32.2% over that same time period—took place in master of accountancy programs.

Employer demand for graduates from master of accountancy programs is soaring. While certified public accountant (CPA) firm hiring of accounting undergraduates has been relatively constant for the last 15 years, hiring from master of accountancy programs by these same firms has witnessed exponential growth in the last five years and now constitutes nearly 40% of total CPA firm hiring of accountants (Moore et al., 2011). These placement trends will undoubtedly sustain growth in applications to master of accountancy programs and make it more important to select the best candidates for graduate accounting education and for the future of the accounting profession.

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International student enrollment in graduate programs across the United States is large (about 14%) and continues to increase. In a recent press release (Witherell, 2012), the number of international students in colleges or universities in the United States grew by 5.7% to 764,495 during the 2011–2012 academic year, with roughly an equal split between graduate and undergraduate education. China, with 25.4% of the total number of international students, is the leading sending country for the third consecutive year and has more than doubled the number of students in American colleges in the last five years (Bartlett & Fisher, 2011). Applications to U.S. master and doctoral programs from China are projected to increase by 18%, which far outpaces growth from other countries and makes China the source for nearly half of all international applications to domestic graduate programs (Korn, 2012). The presence of Chinese students in graduate accountancy programs is even more pronounced. For example, for the master of accountancy programs used as the basis for this study, over 80% of the international students were from China.

Given the explosive growth in international applicants to master of accountancy programs and to a growing Chinese presence, it is more important than ever to understand the information contained in the graduate admission tests to

properly evaluate the capabilities of the applicants. Because almost all graduate programs in accounting utilize admission test scores in applicant evaluations, we investigated the effectiveness of two commonly used standardized admission tests, namely the Graduate Management Admission Test (GMAT) and the Test of English as a Foreign Language (TOEFL), to evaluate international applicants for likely academic success in graduate accounting.

GMAT and TOEFL Scores

MBA.com, the official GMAT website, reports that more than 4,800 graduate management programs around the world use GMAT scores as a part of their admissions process and over 300,000 people took the GMAT in recent years. The GMAT total score is based on the combination of quantitative and verbal assessments. GMAT test takers also complete an analytical writing assessment and an integrated reasoning assessment, neither of which impacts the GMAT total score.

According to the Educational Testing Service (ETS) website, TOEFL test scores are used in the admissions process at more than 8,500 academic institutions throughout the world. The TOEFL exam consists of four equally weighted parts (reading, listening, writing, and speaking). These four English language competency components of the TOEFL have limited overlap with the quantitative assessment of the GMAT exam, which attempts to measure the quantitative reasoning ability of test takers. However, the four TOEFL sections have skills assessment overlap with the GMAT verbal section and the GMAT analytical writing section. Although both the GMAT and TOEFL testing organizations have devoted considerable effort to assess important skills and to make the scoring reliable and consistent, the testing agencies have not necessarily chosen the skills to assess based on independence or uniqueness from other admission test components. For these reasons, it is important to evaluate the incremental information content of each test and its components.

Research Questions

Multiple research questions arise from the direct comparison of the information content of the two admission tests and their components. First, which total score provides the best signal of academic success? Because the GMAT has a quantitative assessment, which is not measured in the TOEFL, the total GMAT score could be considered to have more information content about academic success, but this is an empirical question. Second, because the TOEFL total score is the sum of four parts and the GMAT total score is the sum of two parts, the total scores can be achieved through a wide variety of different combinations of component scores. A natural question is whether the separate component scores for each test contain more information about academic success than the total score? Again, it could be expected that the separate component scores have more information than the total score alone, but it is not clear which components contain the most information about academic success and whether the total score from one test dominates the information in the separate components from the other test. Third, if focusing only on the language (or nonquantitative) components of the two tests, which admission test provides the most information about academic success?

The next section examines prior research on these issues and the role that this study plays in that literature. The methodology and hypotheses are then explored, followed by a discussion of the data utilized and the results obtained. The last section summarizes and concludes the study.

RELATED LITERATURE

Admission Tests and Academic Success

Most of the prior literature on the value of graduate admission tests has focused on the association of GMAT scores with academic success for master of business administration (MBA) students. Initial studies in this area examined the ability of the total GMAT score and undergraduate grade point average (GPA-U) to predict academic success, which was defined as the graduate program cumulative GPA. Gayle and Jones (1973), Deckro and Woundenberg (1977), Carver and King (1994), and Talento-Miller and Rudner (2008) found that the total GMAT score was the best single predictor of MBA GPA. Although based on a small sample ($n = 16$), Koys (2005) reported that the GMAT total score explained 41% of the variance in MBA academic performance. Yang and Lu (2001) found that the most important predictor was undergraduate GPA, when compared with GMAT quantitative and GMAT verbal components. Braunstein (2002) and Talento-Miller, Siegert, and Talliaferro (2011) found GMAT component scores and undergraduate GPA to be strong predictors of academic performance. Predictive ability by a single variable, however, was found to be relatively low (Ahmadi, Raiszadeh, & Helms, 1997) or able to explain only about a quarter of the variation (Sulaiman & Mohezar, 2006) in MBA GPA. More recent extensions to the literature have found the analytical writing score from the GMAT to also have predictive ability. Talento-Miller et al. (2011) and Hill, Hayes, Joyce, and Green (2011) found the writing component of the GMAT to be a useful predictor of academic performance, but concluded along with Sireci and Talento-Miller (2006) that predictive ability for analytical writing alone was relatively low.

A number of recent studies have also examined the TOEFL score of students and its relationship with academic success with mixed results. One of the more recent studies (Koys, 2010) found that for MBAs from Central Europe

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and the Middle East, the TOEFL total score is an excellent predictor of GPA. A second study of engineering students (Wait & Gressel, 2009) found that a positive and significant relationship existed between the TOEFL total score and performance both in the classroom and on a comprehensive assessment examination.

Other studies, however, have found limited or no association between English proficiency scores and academic performance. In a study of first-year graduate-school grades of MBA students, Stolzenberg and Relles (1991) found a positive but modest relationship between TOEFL and GPA. For performance in the initial graduate accounting class, Krausz, Schiff, Schiff, and Van Hise (2005) found that TOEFL total scores are not associated with superior performance. In a study of graduate business school students, Hoefer and Gould (2000) also found no relationship between GPA and the TOEFL total score.

Incremental Information Content

What is noteworthy about the prior studies is that they have investigated the relationship of academic success and GMAT or TOEFL in isolation. Only a few attempts have been made to study the two admission tests together. Using TOEFL and GMAT total scores and component scores, Powers (1980) revealed relatively high correlations (.58–.69) between the GMAT verbal scores and TOEFL component scores, suggesting similar information content. Although the relationship of TOEFL and GMAT scores was examined with a very large sample ($n = 5{,}781$) in the 1980 study, none of the scores were related to academic success measures. Wilson (1985), in an unpublished paper, extended the analysis of the two admission test results to explain MBA GPA, but found high correlation between the two sets of results and a limited increase in explanatory power with the addition of TOEFL as an independent variable. Although these studies were conducted over 25 years ago, correlation between the two tests remains an issue today and calls have been made to eliminate the TOEFL examination as an admission requirement due to a belief that little additional information is provided (see Patterson, Gordon, & Redmond, 2007).

This study contributes to the existing literature in several ways. First, it brings together the stream of research on the GMAT test with that of the TOEFL test to measure total and incremental information content about academic success. Second, it initiates the investigation of the incremental information content of component scores for the TOEFL test. All of the prior TOEFL studies were based on total scores, but the ETS cautions that two applicants with the same total score may have different abilities. Third, most of the prior literature was primarily based on MBA students. Here we focus on students in master of accountancy programs. As suggested by the International Accounting Education Standards Board, accountants need the ability to "present, discuss, report, and defend views effectively through formal and informal, written and spoken communication" (International Accounting Education Standards Board, 2010). This statement suggests that higher order language skills are necessary for success in accounting. And finally, this study links assessment scores to successful performance in an overall curriculum for master of accountancy students. The one study linking TOEFL scores to performance in accounting utilized the grade in only one accounting class as the dependent variable (Krausz et al., 2005). This study utilizes a more robust measure of academic success, the cumulative grade point in an entire master of accountancy program (30 credit hours) as the dependent variable.

METHODOLOGY

Models

Each of the questions addressed in this study is structured to measure the total information content and the incremental information content of the GMAT (or TOEFL) test relative to that contained in the TOEFL (or GMAT) and undergraduate GPA of the applicants. The methodology used to investigate each question is based on the comparison of three separate regression models as shown in the following:

$$\text{Model A } (\text{GPA-MS})_i = \beta_{0A} + \beta_{1A}(\text{GMAT Scores})_i + \beta_{3A}(\text{GPA-U})_i$$

$$\text{Model B } (\text{GPA-MS})_i = \beta_{0B} + \beta_{2B}(\text{TOEFL Scores})_i + \beta_{3B}(\text{GPA-U})_i$$

$$\text{Model C } (\text{GPA-MS})_i = \beta_{0C} + \beta_{1C}(\text{GMAT Scores})_i + \beta_{2C}(\text{TOEFL Scores})_i + \beta_{3C}(\text{GPA-U})_i$$

where, $(\text{GPA-MS})_i$ = the final cumulative GPA in a master of accountancy program for student i and $(\text{GPA-U})_i$ = the undergraduate cumulative GPA for student i.

The GMAT/TOEFL scores in the previous models represent one or more admission test components, depending on the hypothesis to be tested, and GPA-U is used as a control variable throughout the study. Cross-sectional regressions are run sequentially without TOEFL scores (Model A) and without GMAT scores (Model B) to determine the total explanatory power of each respective test with GPA-U, and then with both test scores included (Model C) to allow for computation of incremental information content. The difference between the explained sum of squares of the complete model (Model C) and the reduced model (Model B) is the incremental explanatory power of the GMAT scores and the difference between the explained sum of squares of the complete model (Model C) and the reduced model (Model A) is the incremental explanatory power of the TOEFL scores. The significance of the incremental explanatory power is determined by a partial F statistic.

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Hypotheses

The first hypothesis (*H1*) examines the information content of the total scores from the two admission tests, expressed in null form as:

H1: The GMAT (TOEFL) total score provides no incremental information content over the TOEFL (GMAT) total score and undergraduate GPA.

Those graduate programs that currently consider only total GMAT or total TOEFL scores in their admission decisions should be interested in the results from the following equation:

$$(\text{GPA}-\text{MS})_i = \beta_0 + \beta_1(\text{GMAT}-\text{T})_i + \beta_2(\text{TOEFL}-\text{T})_i + \beta_3(\text{GPA}-\text{U})_i \quad (1)$$

where $(\text{GMAT-T})_i$ = the GMAT total score for student i, $(\text{TOEFL-T})_i$ = the TOEFL total score for student i, and all other variables are as defined previously.

Equation 1 provides the basic relationship for the analysis of total information content and incremental information content of the total scores from the admission tests using Models A, B, and C.[1] The difference between the explained sum of squares for the complete model (Model C) and the reduced model (Model B) for equation 1 is the incremental explanatory power of the GMAT total score. The difference between the explained sum of squares for the complete model (Model C) and the reduced model (Model A) for equation 1 is the incremental explanatory power of the TOEFL total score.

If admission committees suspect that two applicants with the same total score may have different abilities, as suggested on the TOEFL website, perhaps the individual components of the tests may contain more information about academic success than the total score alone. The second hypothesis investigates the information content of the group of component scores from each admission test,[2] which is expressed in the null form as:

H2: The GMAT (TOEFL) component scores as a group provide no incremental information content over the combination of TOEFL (GMAT) component scores and the undergraduate GPA.

To determine the total information content of the GMAT components relative to the TOEFL components and the incremental information content of GMAT components as a group relative to the TOEFL components as a group, the following equation is used to generate Models A, B, and C and to test the second hypothesis:

$$\begin{aligned}(\text{GPA}-\text{MS})_i = {} & \beta_0 + \beta_1(\text{GMAT}-\text{Q})_i + \beta_2(\text{GMAT}-\text{V})_i \\ & + \beta_3(\text{GMAT}-\text{W})_i + \beta_4(\text{TOEFL}-\text{R})_i \\ & + \beta_5(\text{TOEFL}-\text{L})_i + \beta_6(\text{TOEFL}-\text{W})_i \\ & + \text{B}_7(\text{TOEFL}-\text{S})_i + \beta_8(\text{GPA}-\text{U})_i \quad (2)\end{aligned}$$

where $(\text{GMAT-Q})_i$ = the GMAT quantitative score for student i, $(\text{GMAT-V})_i$ = the GMAT verbal score for student i, $(\text{GMAT-W})_i$ = the GMAT analytical writing score for student i, $(\text{TOEFL-R})_i$ = the TOEFL reading score for student i, $(\text{TOEFL-L})_i$ = the TOEFL listening score for student i, $(\text{TOEFL-W})_i$ = the TOEFL writing score for student i, $(\text{TOEFL- S})_i$ = the TOEFL speaking score for student i, and all other variables are as defined previously.

For the GMAT components, the partial F test assesses coefficients β_1 through β_3 (H_{02}: $\beta_1 = \beta_2 = \beta_3 = 0$) in equation 2 to determine if the GMAT component scores as a group possess incremental information content over the TOEFL component scores and undergraduate GPA. For the TOEFL components, the partial F test assesses coefficients β_4 through β_7 (H_{02}: $\beta_4 = \beta_5 = \beta_6 = \beta_7 = 0$) in equation 2 to determine if the TOEFL component scores as a group possess incremental information content over the GMAT component scores and undergraduate GPA.

TOEFL currently has four English language competency component scores (reading, listening, writing, and speaking) and the GMAT contains both verbal and writing English language competency components. The third hypothesis investigates which of the English language competency components as a group contain the most total information content and incremental information content about academic success and is expressed in null form as:

H3: The GMAT (TOEFL) English language competency component scores as a group provide no incremental information content over the TOEFL (GMAT) English language competency component scores and undergraduate GPA.

To test the third hypothesis, the following equation is used to generate Models A, B, and C:

$$\begin{aligned}(\text{GPA}-\text{MS})_i = {} & \beta_0 + \beta_1(\text{GMAT}-\text{V})_i + \beta_2(\text{GMAT} \\ & - \text{W})_i + \beta_3(\text{TOEFL}-\text{R})_i \\ & + \beta_4(\text{TOEFL}-\text{L})_i + \beta_5(\text{TOEFL}-\text{W})_i \\ & + \beta_6(\text{TOEFL}-\text{S})_i + \beta_7(\text{GPA}-\text{U})_i. \quad (3)\end{aligned}$$

where all variables are as defined previously.

For the GMAT components, the partial F test assesses coefficients β_1 and β_2 (H_{03}: $\beta_1 = \beta_2 = 0$) in equation 3 to determine if the GMAT component scores possess incremental information content over the TOEFL component scores and undergraduate GPA. For the TOEFL components, the partial F test assesses coefficients β_3 through β_6 (H_{03}: $\beta_3 = \beta_4 = \beta_5 = \beta_6 = 0$) to determine if the TOEFL component scores possess incremental information content over the GMAT component scores and undergraduate GPA.

Data

The data for this study were collected from international students who completed their master of accountancy degree at one of two universities over the period from 1999–2012. One program was located in the Midwest and the other was located on the west coast of the United States. Each program required students to complete a minimum of 30 credit hours of course work over two semesters, so the dependent variable in this study (GPA-MS) is a broad based (at least 30 credit hours) and reliable (average of 10 or more courses) measure of academic success. The independent variables include the total and component scores for each international student on the GMAT and TOEFL,[3] along with their undergraduate GPA.

Table 1 provides descriptive statistics for each of the variables utilized in this study. Because this study is based on students who have been admitted and who have successfully completed a master of accountancy program, Table 1 reveals the high quality of the international students, with an average undergraduate GPA of 3.5, average total TOEFL of 108, and average GMAT total score of 709. Although the average quality is high, the sample also contains a reasonable amount of variability, as reflected in the range and standard deviation for each dependent and independent variable, to allow for cross-sectional information content comparisons. Table 1 also reveals that 30 of the 120 records did not contain a TOEFL-S score, because these students took the exam prior to the implementation of the speaking component.

Table 2 provides the country of citizenship for the sample utilized in this study. The sample includes students from China, India, Japan, Norway, South Korea, Thailand, and Taiwan. The sample composition is consistent with the fact that China is now the leading sending country of students to the United States but the representation of students from non-Chinese countries suggests that master of accountancy programs continue to appeal to a wider group of international students.

TABLE 1
Sample Descriptive Statistics

Item	*n*	*M*	*SD*	Minimum	Maximum
Dependent variable					
GPA-MS	120	3.57	0.22	3.00	4.00
Independent variables					
GMAT-T	120	708.67	51.60	540.00	780.00
GMAT-Q	120	41.86	8.89	15.00	51.00
GMAT-V	120	43.76	7.69	19.00	51.00
GMAT-W	120	4.83	0.70	3.00	6.00
TOEFL-T	120	108.01	6.27	74.00	120.00
TOEFL-R	120	27.95	1.87	18.00	30.00
TOEFL-L	120	27.78	2.46	14.00	30.00
TOEFL-W	120	25.68	3.12	14.00	30.00
TOEFL-S	90	26.10	2.65	17.00	30.00
GPA-U	120	3.50	0.27	2.77	3.99

TABLE 2
Country of Citizenship for Sample

Country	# of students
China	98
India	2
Japan	1
Norway	1
South Korea	9
Thailand	1
Taiwan	8
Total	120

Table 3 displays correlations between the test scores and the GPA variables used to examine the information content of the admission tests. The correlations among the independent variables displayed in Table 3 make the incremental information content methodology especially appealing because (a) nonzero correlations suggest that each independent variable contains some of the same information as other independent variables and (b) the focus is on the contribution to explanatory power of a group of independent variables regardless of the colinearity among them.

RESULTS

Equation 1 is used to examine the total information content and the incremental information content of GMAT-T and TOEFL-T. The total information content focuses on the explanatory power of the independent variables, while the incremental information content focuses on the incremental explanatory power[4] over and above that provided by the other admission test results and undergraduate GPA. Similar to the structure for all of the tests conducted in this study, Table 4 presents results for Model A (without TOEFL-T), Model B (without GMAT-T), and Model C (with GMAT-T and TOEFL-T).

The column labeled as Model A in Table 4 indicates that GMAT-T is significant at the .05 level, GPA-U is significant at the .01 level, and the independent variables explain 11.0% of the variability in GPA-MS, as reflected in the adjusted R^2. Model B indicates that TOEFL-T and GPA-U are each significant at the .01 level and together they explain more of the variability (13.2%) in GPA-MS. As expected, both total scores with GPA-U (Model C) explain the most variability (13.9%), but the only assessment test score which is significant at the .05 level in Model C is TOEFL-T (see partial F or t statistic). Notably, the results indicate that TOEFL-T and GMAT-T do not contain the same assessment information related to academic success and TOEFL-T contains more information content (as measured by adjusted R^2) and statistically significant incremental information content over and above that contained in GMAT-T and GPA-U.

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TABLE 3
Pearson Product-Moment Correlations

Item	GPA-MS	GMAT-T	GMAT-Q	GMAT-V	GMAT-W	TOEFL-T	TOEFL-R	TOEFL-L	TOEFL-W	TOEFL-S	GPA-U
GPA-MS	—										
GMAT-T	.273	—									
GMAT-Q	.256	.546	—								
GMAT-V	–.039	.238	–.676	—							
GMAT-W	.218	.351	.198	.097	—						
TOEFL-T	.292	.369	.261	.043	.213	—					
TOEFL-R	.370	.300	.214	.028	.141	.684	—				
TOEFL-L	.111	.349	–.155	.503	.211	.542	.280	—			
TOEFL-W	.256	.261	.579	–.428	.253	.611	.380	–.102	—		
TOEFL-S	–.088	–.063	–.330	.472	–.051	.586	.143	.295	.002	—	
GPA-U	.295	.294	.227	.009	.127	.178	.166	.172	.138	–.146	—

Because two test-takers with the same total score can have strengths and weaknesses in different skills, equation 2 is used to examine the information content and incremental information content of the GMAT (TOEFL) component skills as a group relative to the TOEFL (GMAT) component skills as a group. Of the 120 observations, 30 did not contain TOEFL-S scores because the students took the exam prior to the implementation of the speaking component, so the results for the second hypothesis are based on the smaller sample of 90 students. As shown in Table 5, Model A results (without TOEFL components) indicate that GPA-U and GMAT components together explain 7.4% (see the adjusted R^2) of the variability in GPA-MS, which interestingly is less than that explained by GMAT-T (11.0%) in Model A of Table 4. GPA-U and TOEFL components (Model B in Table 5) explain 13.2% of the variation, which is identical to that explained by TOEFL-T in Model B of Table 4. All of the independent variables together (Model C in Table 5) explain 14.6% of the variability in GPA-MS. The GMAT components as a group contain very little incremental explanatory power once GPA-U and TOEFL components are included as independent variables, as represented by a partial F test of 1.46. In contrast, the incremental information content from the TOEFL component scores as a group, as reflected in the partial F statistic of 2.79, is statistically significant at the .05 level. In summary, the TOEFL components as a group contain more total explanatory power and statistically significant incremental explanatory power than do the GMAT components. Interestingly, GPA-U loses its statistical significance as the analysis progressed from total score analysis (Table 4) to component score analysis

TABLE 4
Incremental Information Content Results for GMAT and TOEFL Total Scores

Independent variable	Model A	Model B	Model C
Intercept	2.252**(6.97)	1.888**(4.91)	1.728**(4.37)
GMAT-T	.001*(2.25)		.001(1.41)
TOEFL-T		.009**(2.85)	.007*(2.22)
GPA-U	.196**(2.60)	.209**(2.90)	.183**(2.46)
Observations	120	120	120
R^2	.125	.147	.161
Adjusted R^2	.110	.132	.139
Partial F for GMAT-T (Model C vs. B)			1.99
Partial F for TOEFL-T (Model C vs. A)			4.93*

Note: Equation 1 $(\text{GPA-MS})_i = \beta_0 + \beta_1(\text{GMAT-T})_i + \beta_2(\text{TOEFL-T})_i + \beta_3(\text{GPA-U})_i$

Note: t statistics are shown in parentheses to the right of each coefficient estimated from the model in Equation 1. $^*p < .05$. $^{**}p < .01$. (one-sided).

TABLE 5
Incremental Information Content Results for GMAT and TOEFL Components

Independent variable	Model A	Model B	Model C
Intercept	2.377** (5.14)	2.038** (3.63)	1.585** (2.50)
GMAT-Q	.005* (1.70)		.003 (0.81)
GMAT-V	.006 (0.99)		.008 (1.29)
GMAT-W	.045 (1.20)		.048 (1.33)
TOEFL-R		.038** (3.07)	.038** (3.05)
TOEFL-L		.009 (0.54)	.004 (0.26)
TOEFL-W		.002 (0.21)	.001 (0.10)
TOEFL-S		−.011 (−1.26)	−.014 (−1.31)
GPA-U	.133 (1.47)	.126 (1.48)	.116 (1.33)
Observations	90	90	90
R^2	.115	.180	.222
Adjusted R^2	.074	.132	.146
Partial F for GMAT components (Model C vs. B)			1.46
Partial F for TOEFL components (Model C vs. A)			2.79*

Note: Equation 2 $(\text{GPA-MS})_i = \beta_0 + \beta_1(\text{GMAT-Q})_i + \beta_2(\text{GMAT-V})_i + \beta_3(\text{GMAT-W})_i + \beta_4(\text{TOEFL-R})_i + \beta_5(\text{TOEFL-L})_i + \beta_6(\text{TOEFL-W})_i + \beta_7(\text{TOEFL-S})_i + \beta_8(\text{GPA-U})_i$

Note: t statistics are shown in parentheses to the right of each coefficient estimated from the model in equation 2. $^*p < .05$. $^{**}p < .01$. (one-sided).

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TABLE 6
Incremental Information Content Results for GMAT and TOEFL Non-Quantitative Components

Independent variable	Model A	Model B	Model C
Intercept	2.622**(5.90)	2.038**(3.63)	1.582**(2.50)
GMAT-V	−.000(−0.06)		.006(1.08)
GMAT-W	.067*(1.92)		.056(1.63)
TOEFL-R		.038**(3.07)	.039**(3.16)
TOEFL-L		.009(0.54)	.006(0.39)
TOEFL-W		.002(0.21)	.004(0.35)
TOEFL-S		−.011(−1.26)	−.016(−1.52)
GPA-U	.175*(2.00)	.126(1.48)	.133(1.57)
Observations	90	90	90
R^2	.085	.180	.216
Adjusted R^2	.053	.132	.149
Partial F for GMAT components (Model C vs. B)			1.877
Partial F for TOEFL components (Model C vs. A)			3.430*

Equation (3) $\text{GPA-MS}_i = \beta_0 + \beta_1(\text{GMAT-V})_i + \beta_2(\text{GMAT-W})_i + \beta_3(\text{TOEFL-R})_i + \beta_4(\text{TOEFL-L})_i + \beta_5(\text{TOEFL-W})_i + \beta_6(\text{TOEFL-S})_i + \beta_7(\text{GPA-U})_i$

Note: t statistics are shown in parentheses to the right of each coefficient estimated from the model in equation 3. $^*p < .05$. $^{**}p < .01$ (one-sided).

(Table 5), suggesting that GPA-U may be less valuable if admission officers used component TOEFL or GMAT scores to evaluate candidates. Of all the component scores from the admission tests, the reading score for the TOEFL exam (TOEFL-R) appears to be the component with the strongest association with academic success (see Model C of Table 5).

The third hypothesis more directly compares the information content of similar components of the two tests. Because the quantitative component of the GMAT is unique in that it assesses a non–language-related skill, it is not included in the third hypothesis. Table 6 presents the information content results for the English language competency components only of the GMAT and TOEFL tests, as described in equation 3. The adjusted R^2 for Model A and Model B in Table 6 indicates that the TOEFL English language competency component scores explain more than twice as much (13.2–5.3%) of the variability in GPA-MS as the GMAT English language competency components. Model C of Table 6 suggests that both sets of components together explain 14.9% of the variability in GPA-MS. The partial F statistic of 1.877, which evaluates the incremental explanatory power of Model C relative to Model B in Table 6, suggests that the GMAT English language competency components as a group are not statistically significant when controlling for the TOEFL components and GPA-U. In contrast, the partial F statistic of 3.430 suggests that the TOEFL English language competency component scores as a group provide statistically significant incremental explanatory power over the similar GMAT scores and GPA-U at the .05 level. Model C from Table 6 also suggests that TOEFL-R (significant at the .01 level) has the strongest association with academic success.[5]

SUMMARY AND CONCLUSIONS

Given the explosive growth in master of accountancy programs, the increased hiring by CPA firms from those programs, and the tremendous increase in applications from international students to these programs, it is more important than ever to understand the information content of the graduate admission tests for optimal student selection. This study used actual data for 120 international students, who applied to and then successfully completed one of two master of accountancy programs, to study the relationship of admissions tests to academic success.

The results indicate that the TOEFL total score and component scores are more highly associated with academic success than the GMAT total score and component scores. When controlling for undergraduate GPA and other admission test scores, the TOEFL exam is the only admission test that yields statistically significant incremental information content about academic success. This result holds whether considering the writing components only, the English language competency components only, the total scores, or the components of each admission test. In contrast to a recent call to eliminate TOEFL scores from admission requirements (Patterson et al., 2007), this study suggests that if admission officers were to eliminate one of the tests for international applicants, it should not be the TOEFL.

NOTES

1. The partial F statistic, as the name implies, evaluates the significance of part of the model. When the difference between the complete (Model C) and the reduced model (Model A or B) is only one independent variable, as in equation 1, the partial F is the square of the t statistic for that independent variable in the complete model (Model C) and the t statistic and partial F statistic reflect the same significance level for the incremental explanatory power.
2. Because the GMAT integrated reasoning assessment was not required until June 2012, that component was not available for the master of accounting students included in this study.
3. Because some students may have submitted paper-based, computer-based, and internet-based (iBT) TOEFL scores, all have been converted to iBT scaling using the iBT score comparison tables published by ETS. ETS has conducted an extensive research program since the 1970s to assure the reliability and comparability of the TOEFL scores.

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4. Because tests of significance for incremental information content depend on both changes in explained sum of squares and changes in degrees of freedom, which can be different from model to model, we focus on adjusted R^2 and partial F statistics from the regressions. The R^2 for each model in Tables 4–6 is also provided for the sake of completeness.
5. Because both the GMAT and TOEFL admission tests provide assessments of writing ability, the methodological approach of this study was extended to consider the information content of GMAT-W and TOEFL-W. Consistent with the results reported for tests of the hypotheses in this study, only the TOEFL-W score was found to provide statistically significant incremental information content (at the .05 level) about academic success.

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