

Validity of Selection Criteria in Predicting MBA Success

**Terry C. Truitt
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— CBFA Conference 2002 —

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Introduction and Purpose

Universities have a history of attempting to predict the academic performance of potential students. Graduate business schools are no exception. A large majority of all graduate schools of business in the United States establish minimum admission requirements for entry of applicants into their programs (Gayle and Jones, 1973; Paolillo, 1982; Youngblood and Martin, 1982). Typically, applicants are screened on the basis of performance in undergraduate programs and scores on the Graduate Management Admission Test (GMAT). In most cases, undergraduate GPAs and GMAT scores constitute the primary criteria by which admissions officials make decisions regarding acceptance or rejection of applicants (Benson, 1983). In many cases, these two criteria are weighted with other selection criteria to allow schools to establish objective standards in screening applicants for admission.

Over the last decade or so, reliance on standardized and purely quantitative selection criteria has come under attack (Ravitch, 1989; Murphy, 1992; Zeff, Fremgen, and Martinez, 1994; and Hancock 1998). In a federal ruling, a New York judge banned the use of the Scholastic Aptitude Test (SAT), the nation's most widely used college entrance exam on the basis that some protected groups perform better than others. The ruling stated that such use violates the equal protection clause of the United States Constitution. As selection criteria come under closer scrutiny, it becomes increasingly important to provide evidential support and validity for the criteria used in selection processes.

The purpose of this study is twofold: (1) to determine the validity of selection criteria in predicting graduate business academic performance, namely undergraduate

GPA's and GMAT scores; and (2) to determine the applicability of selection criteria to sub-groups of the sample.

Using a sample of MBA students at a private, Midwestern university, variations in academic performance between subsets of graduate business school students are examined. A split-sample regression technique is employed in an effort to determine whether the examined selection criteria measures are better predictors of performance for some groups of students than for others.

Generally, the following three questions are addressed:

1. Do the typical selection criteria used for MBA admission predict academic performance in graduate business school?
2. Are the typical selection criteria used for MBA admission better predictors of academic performance for some groups of students than for others?
3. What are the implications of admissions officials seeking to establish or modify admissions policies at their institutions?

Sub-Groups

Gender Bias in Admission Criteria

In investigating the ability of various admissions criteria to forecast success in graduate study, researchers have typically correlated undergraduate GPA's and standardized tests such as the GMAT with graduate GPA's. Even when correlations are positive, the magnitude has varied considerably (Livingston and Turner, 1982).

On the occasions when gender has been evaluated as a variable, differences in validity coefficients have often been found (Covert and Chansky, 1975, Kaczmarek and Fanco, 1986; Payne, Wells and Clark, 1971; Michael, Nadson, and Michael, 1983), although there are exceptions (Wilson, 1982). The analyses in these studies have typically

proceeded by dividing the sample into male and female subgroups. While an efficient method, a more effective and perhaps superior procedure is to consider the interaction between gender and these other independent variables as part of an overall regression analysis (Cohen and Cohen, 1983). Both approaches are applied in this study.

Ravitch (1989) and Murphy (1992) have found that females tend to get better grades in undergraduate college than admission criteria predict. Therefore, the initial subgroup research question is, “Do admission criteria’s ability to predict MBA success apply equally to men and women?”

Interestingly, a cursory review of the sample data indicates that the difference in academic performance between male and female is statistically insignificant (t-test). For overall sample, overall graduate GPA is 3.74, with males scoring 3.75 and females scoring 3.73. This result makes the outcome more interesting and allows the research question to become, “With statistically equal graduate performance between males and females, do the selection criteria predict equal graduate performance?” This research effort addresses this question.

Age Bias in Admission Criteria

Several studies (for example, Hecht, Manning, Swinton, and Broun, 1989) have indicated that GMAT scores decline with a person’s age and the time since a person’s last academic degree. The falloff in these scores was found to be greatest for people 34 years and older; just at the age where many business executives are beginning to enter the most successful and productive portion of their careers. In a similar vein, many MBA admissions officers (anecdotal) feel that the undergraduate GPA declines in importance

as a predictor variable for graduate performance when the time since obtaining the undergraduate degree exceeds 10 years. Admissions officers are concerned that other factors might be more important as a potential student's age and experience increase.

The admissions officers' question, "Are we not selecting some older students that we should be selecting?" becomes the research question, "Does the accuracy of undergraduate performance and GMAT scores as indicators of graduate academic performance decline with as students age?" This research effort addresses this question.

While an increasing number of MBA programs require work experience prior to admission, many allow students to enter graduate business school right after graduation from undergraduate school. There is some discussion among MBA admissions officers about the importance of professional experience prior to studying in an MBA program. The admissions officers' question is, "Does experience matter in MBA academic success?" This research effort addresses this question.

Methodology

Categorical Subgroups

In testing the validity of selection criteria among subgroup categories, the general null hypothesis holds that the selection criteria predict graduate performance similarly for all subgroups. This approach focuses particularly on variation among gender and age subgroups.

Regression Predictors

Regression analyses are utilized to determine whether the examined selection criteria are better predictors of performance for some groups of students than others.

Academic performance is the dependent variable and certain selection criteria and descriptive characteristics serve as independent variables. First, a regression analysis is applied to the entire sample group. Next, regressions are run on subgroups and compared to observe any differences between subgroups.

Both performance on the GMAT and performance in undergraduate school are expected to be positively related to success in graduate business school. *Ceteris paribus*, graduate students with Bachelor of Science degrees, with majors that are quantitative, or with majors in business are expected to outperform graduate students with Bachelors of Arts degrees, with majors that are non-quantitative, or with majors not in business. Younger students are hypothesized to academically outperform older students and males are hypothesized to academically outperform female students. Students that are married are expected to academically outperform students that are single.

The hypothesized expectations are expressed in the model:

$$\text{GGPA} = f(\text{GMAT}, \text{UGPA}, \text{BSBA}, \text{QUANT}, \text{BIZMAJOR}, \text{AGE}, \text{GENDER}, \text{MARRIED})$$

(+) (+) (+) (+) (+) (-) (+) (-)

where:

- GGPA** = Graduate grade point average;
- GMAT** = GMAT score, graduate management admissions test;
- UGPA** = Undergraduate grade point average;
- BS-BA** = Undergraduate degree was Bachelor of Science or of Art;
- QUANT** = Undergraduate degree had quantitative major;
- BIZMAJOR** = Undergraduate major was a business or non-business major;
- AGE** = Age of student at time of admission in years;
- GENDER** = Student gender, male or female; and
- MARRIED** = Student marital status at admission, married or single.

Data Description

With 158 observations, the dataset is a sample of MBA students at a private, Midwestern university. The program is offered in a traditional semester format and is primarily taught by full-time faculty, but is scheduled in the evenings so as to accommodate working adults. About one-third of the students in the sample are female, representative of the program's historical gender participation rate (the most recent graduation class, 2002, was over fifty percent female). Roughly one-third of the students in the sample are younger than 30 years old, one-third are between 30 and 40 years old, and one-third are older than 40 years old.

Results

Altogether, four regressions are performed.

- ◆ A general regression, based on the specified model, is performed using the entire data sample.
- ◆ Two secondary regressions is performed on male and female subgroups to address the gender question.
- ◆ Three secondary regressions are performed on the three age subgroups: Younger than 30, between 30 and 40, and older than 40.

Entire Data Sample

Overall, the general regression on the entire sample supports the expectation that GMAT scores have a statistically significant impact on MBA academic success. However, the results do not support the hypothesized predictability of undergraduate GPA. In fact, for the model specified, GMAT score and MARRIED were the only two statistically significant predictor variables. GMAT score, as a predictor of academic performance, outperforms undergraduate GPA, student's age, students' gender, and the

type of undergraduate degree or major as evidenced by the statistical insignificance of these variables.

Interestingly, marital status has a statistically significant impact on MBA academic success. The evidence supports the notion that, as a group, married students outperformed single students. While the author is far from recommending marital status as a selection criterion, the results do provide evidence for graduate students and for academic advisors that marriage has a positive impact on graduate academic success.

Gender Analysis

In the overall regression analysis, which includes both gender groups, the only statistically significant variables are GMAT and MARRIED. When the sample is analyzed by subgroups based on male and female, the results show that the variable GMAT continues to be a predictor of graduate performance for both males and females. However, for the female subgroup, no other variable is significant, including the variable MARRIED. MARRIED does have a statistically significant impact on academic performance for the male subgroup. Specifically, the results suggest that marriage enhances the academic performance of the male students. Furthermore, the results suggest that marriage has no effect on the academic performance of the female students.

Interestingly, for the entire dataset (combining the male and female gender subgroups) when either of the two variables used to predict graduate academic success, GMAT and UGPA, are regressed with the other predictor variables, then the GENDER variable is statistically significant. With GMAT as the dependent variable, the GENDER variable is positive and statistically significant indicating that male students in the dataset

score higher than their female colleagues. However, with UGPA as the dependent variable, the GENDER variable is negative and statistically significant indicating that female students in the dataset have higher undergraduate GPAs than their male colleagues. So, males outscore their females colleagues on the GMAT and females outscore their male colleagues on undergraduate GPAs, but there is no difference between genders in graduate academic performance.

For the two regression analyses subdivided by gender, the variable GENDER is omitted since it provides no explanatory power to the study (all of the observations in the female subgroup were, well, female, resulting in no variation in the GENDER variable. The same applies for the male subgroup).

Age Analysis

In the regression analysis that includes all three age subgroups the only statistically significant variables are GMAT score and MARRIED. A regression analysis is performed on the three age subgroups (Under 30, Between 30 and 40, and Over 40) to determine if the validity of undergraduate performance and GMAT scores as indicators of graduate academic performance decline as students age. For all three age subgroups, the GMAT scores have a positive and statistically significant impact on graduate performance. The continued robustness of the GMAT score variable provides further support for the use of GMAT scores as a predictor of academic performance.

As found in the GENDER subgroups analyses, undergraduate GPA does not have a statistically significant influence on the level of academic performance for any of the three age subgroups. In the younger age group analysis, only GMAT scores and AGE

were statistically significant predictors. The younger age group is the only subgroup analysis in which the AGE variable shows a positive and statistically significant impact on graduate performance. This is particularly interesting if the variation in age for the younger age group can be a proxy for maturity or experience. The variation in age (years of experience) among students under 30 does explain statistically significant variation in academic performance. The variation in age among students over 30 does not explain any variation in academic performance.

For the middle age group, two variables were statistically significant in addition to GMAT score, MARRIED and QUANT major. The middle age group is the only age subgroup for which MARRIED is significant which indicates that marriage has the greatest positive impact on academic performance for students between the ages of 30 and 40. The influence of the variable QUANT major is statistically significant and positive for the middle age group. The results suggest that for students between the ages of 30 and 40, having a quantitative undergraduate major enhances graduate academic performance.

The GMAT score and QUANT major variables are the only two statistically significant variables for the older age group (over 40 years old). GMAT score is again a positive predictor of graduate academic performance. As was the case with the middle age group, the variable QUANT major has a positive impact on graduate academic performance. Since QUANT major is not a statistically significant factor for the younger age groups, but is for the two older age groups (students over 30), the implication is that having a quantitative undergraduate major enhances academic performance for older students.

Unlike in the gender subgroup analyses, the focal variable AGE is not omitted for the three age subgroup analyses since the variable AGE does exhibit variation even among the age subgroups.

Policy Implications

The outcomes of the study are of academic interest and of practical usefulness. Policy implications for three areas are addressed: (1) GMAT and Undergraduate GPAs; (2) Gender and Age; and (3) Undergraduate Major.

GMAT and Undergraduate GPAs

The results provide evidence that strongly supports the use of GMAT scores as a predictor of MBA academic performance, giving credence to the use of GMAT scores as a MBA admission selection criterion. The study should give MBA graduate admission officers confidence in the use of GMAT as a predictor of performance.

However, the findings show very little support for the use of undergraduate GPAs as a selection criterion. Undergraduate GPAs have no statistically significant impact on MBA academic performance, suggesting caution in the use of undergraduate GPA as a selection criterion. One explanation for the ineffective predicting power of undergraduate GPAs is the apparent lack of uniformity among undergraduate programs (curriculum, rigor, etc.). In fact, the GMAT and other national, standardized exams were developed and flourish because of the difficult interpretation of divergent undergraduate GPAs.

Gender and Age

Many MBA programs across the country are interested in strengthening female enrollment in their programs. In doing so, admission officers should use caution when using GMAT and undergraduate GPAs as nondiscretionary selection criteria. This study provides evidence that while gender is not a factor in graduate academic performance, males and females do not perform equally on the predictors of graduate academic performance.

A growing number of MBA programs require some number of years work experience prior to admission. The research findings support the use of work experience as selection criterion. For MBA students under 30, age is a factor in academic performance. Since age is not a factor for older students, it is assumed that age is a proxy for maturity or experience for the younger students. Age (years of experience) does not predict academic performance for students over 30 years of age, but does have a positive impact on the academic performance for students younger than 30.

Undergraduate Major

Unexpectedly, students with undergraduate majors in business performed no better than students with non-business majors. While unexpected, the result does provide support for requiring prerequisite undergraduate business study prior to MBA admission.

Whether a student has a quantitative or non-quantitative undergraduate major does impact MBA academic performance, but only for students over 30. Having a quantitative or non-quantitative undergraduate major is not as important for younger students as it is for older students. The difference may indicate that skills learned in

undergraduate school languish with age, but less so for students who had quantitative undergraduate majors.

Conclusion

GMAT scores are found to be a robust predictor of MBA academic performance. Very little support is found for using undergraduate GPAs as a selection criterion. The study provides evidence that two widely-used MBA admission criteria (GMAT score and undergraduate GPA) are impacted by student gender. However, in examining the same sample of MBA students, gender is not a factor in actual academic graduate performance. For younger students, work experience is positively related to students' academic success. For older students, having a quantitative undergraduate background has a positive impact on academic performance. Marriage was found to be positively related to academic success for younger male students. Overall, and in all subgroups, the GMAT exam was positively related to academic success, providing general support for its use as a selection criterion.

—Complete and detailed bibliography is available upon request—

Regression Results for Entire Sample Dataset

| | |
|-------------------|----------|
| R-square | 0.30 |
| Adjusted R-Square | 0.26 |
| Observations | 158.00 |
| F-statistic | 7.02 |
| Significance F | 2.07E-08 |

| Variables | Coefficients | t Stat | P-Value |
|-----------|---------------|--------------|--------------|
| Intercept | 3.1814301330 | 23.519028780 | 7.52E-52 |
| GMAT | 0.0009576400 | 5.278084120 | 4.56E-07 |
| UGPA | 0.0164460680 | 0.446712666 | 0.6557355110 |
| BSBA | 0.0502106550 | 1.423384341 | 0.1567294260 |
| QUANT | -0.0220727800 | 0.683515353 | 0.4953499510 |
| BIZMAJOR | -0.0348285710 | -1.095572691 | 0.2750454350 |
| AGE | -0.0029752980 | -1.537543970 | 0.1262953510 |
| GENDER | 0.0206707830 | 0.573889070 | 0.5966913900 |
| MARRIED | 0.0761470940 | 2.143170654 | 0.0337340970 |

Regression Results for Female Subgroup

| | |
|-------------------|----------|
| R-square | 0.46 |
| Adjusted R-Square | 0.37 |
| Observations | 50.00 |
| F-statistic | 5.03 |
| Significance F | 3.34E-04 |

| Variables | Coefficients | t Stat | P-Value |
|-----------|---------------|--------------|--------------|
| Intercept | 2.9009856670 | 14.466539590 | 6.46E-18 |
| GMAT | 0.0015209340 | 4.168028870 | 1.50E-04 |
| UGPA | 0.0250132220 | 0.367231173 | 0.7152905450 |
| BSBA | 0.0683721010 | 1.001130047 | 0.3224971630 |
| QUANT | 0.0119165260 | 0.215365805 | 0.8305245660 |
| BIZMAJOR | 0.0040539030 | 0.072676197 | 0.9424087960 |
| AGE | -0.0021798220 | -0.671129033 | 0.5058127870 |
| GENDER | | | |
| MARRIED | 0.0573663010 | 1.090145275 | 0.2818643180 |

Regression Results for Male Subgroup

| | |
|-------------------|----------|
| R-square | 0.22 |
| Adjusted R-Square | 0.17 |
| Observations | 108.00 |
| F-statistic | 4.20 |
| Significance F | 4.25E-04 |

| Variables | Coefficients | t Stat | P-Value |
|-----------|---------------|--------------|--------------|
| Intercept | 4.4454002710 | 19.258098700 | 2.02E-35 |
| GMAT | 0.0008279000 | 3.899841766 | 1.74E-04 |
| UGPA | -0.0113478820 | -0.240120757 | 0.8107281860 |
| BSBA | 0.0638768400 | 1.459925447 | 0.1474450610 |
| QUANT | -0.0375676840 | -0.885077270 | 0.3782383060 |
| BIZMAJOR | -0.0588325770 | -1.437652814 | 0.1536545060 |
| AGE | -0.0034607600 | -1.431522510 | 0.1553985280 |
| GENDER | | | |
| MARRIED | 0.0807692580 | 1.680014362 | 0.0960760700 |

Regression Results for Young (under 30) Subgroup

| | |
|-------------------|----------|
| R-square | 0.43 |
| Adjusted R-Square | 0.32 |
| Observations | 50.00 |
| F-statistic | 3.12 |
| Significance F | 6.15E-03 |

| Variables | Coefficients | t Stat | P-Value |
|-----------|---------------|--------------|--------------|
| Intercept | 1.6132188280 | 2.975164417 | 4.95E-03 |
| GMAT | 0.0008416220 | 2.853599012 | 0.0068144320 |
| UGPA | 0.0698840580 | 1.090321244 | 0.2820964590 |
| BSBA | 0.0719052600 | 1.294519592 | 0.2029094760 |
| QUANT | -0.0777713570 | -1.546610327 | 0.1298833630 |
| BIZMAJOR | -0.0132002000 | -0.254406244 | 0.8004850840 |
| AGE | 0.0562426530 | 3.301410281 | 0.0020307960 |
| GENDER | 0.0165352701 | 0.334095490 | 0.7400528670 |
| MARRIED | 0.0459142870 | 0.894135313 | 0.3765986700 |

Regression Results for Middle (30-40 yrs) Subgroup

| | |
|-------------------|----------|
| R-square | 0.48 |
| Adjusted R-Square | 0.39 |
| Observations | 56.00 |
| F-statistic | 4.76 |
| Significance F | 1.60E-04 |

| Variables | Coefficients | t Stat | P-Value |
|-----------|---------------|--------------|--------------|
| Intercept | 3.2440107610 | 7.739218900 | 7.19E-10 |
| GMAT | 0.0010699070 | 3.522102143 | 0.0009790500 |
| UGPA | 0.0411373940 | 0.570088873 | 0.5713915020 |
| BSBA | 0.0003176300 | 0.004933994 | 0.9960845940 |
| QUANT | 0.1158059780 | 1.859875299 | 0.0693046180 |
| BIZMAJOR | 0.0218718530 | 0.390760061 | 0.6977785410 |
| AGE | -0.0099900020 | -1.040120180 | 0.3037203400 |
| GENDER | 0.0938103280 | 1.119226463 | 0.2688539270 |
| MARRIED | 0.1469369790 | 1.995586434 | 0.0519205180 |

Regression Results for Older (over 40) Subgroup

| | |
|-------------------|----------|
| R-square | 0.48 |
| Adjusted R-Square | 0.37 |
| Observations | 52.00 |
| F-statistic | 4.23 |
| Significance F | 6.04E-03 |

| Variables | Coefficients | t Stat | P-Value |
|-----------|---------------|--------------|--------------|
| Intercept | 3.4381410000 | 11.203590000 | 3.39E-14 |
| GMAT | 0.0010250000 | 3.231851000 | 0.0023940000 |
| UGPA | 0.0335280000 | 0.578537000 | 0.5659910000 |
| BSBA | 0.0879720000 | 1.341303000 | 0.1870310000 |
| QUANT | 1.0855700000 | 2.008501000 | 0.0510480000 |
| BIZMAJOR | -0.0848930000 | -1.547314000 | 0.1292900000 |
| AGE | -0.0062200000 | -1.247612000 | 0.2908500000 |
| GENDER | -0.0330860000 | -0.519303000 | 0.6062750000 |
| MARRIED | 0.0179540000 | 0.267840000 | 0.7904060000 |

Terry C. Truitt

Biography

Terry C. Truitt, Associate Professor of Finance and MBA Program
Director

Dr. Truitt received his MBA from the University of North Alabama and his DBA in Finance at Mississippi State University.

In addition he has seven years of corporate experience with Zale Corporation.

Terry is currently Associate Professor of Economics and Finance at Anderson University.

He also serves as the MBA Director for the Falls School of Business at AU, and MBA enrollment, currently at 190, has doubled during his tenure in that position.

Terry is a deacon in his church, and he and Pam have three young children.