

# Graduate Management Admission Test Outcomes And The Academic Achievement: A Study On Masters Of Business Administration Students At Makerere University, Uganda

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## ABSTRACT

*This study investigates whether the outcomes of the Graduate Management Admission Test (GMAT) can predict the academic achievement of enrollees in masters programs. The study is based on administrative data of 516 Masters of Business Administration (MBA) enrollees at the College of Business and Management Science, Makerere University in the 2011 and 2012 enrollment cohorts. The Cumulative Grade Point Average (CGPA) in the bachelor's degree and that of the first year of master's studies were adopted as measures of the academic achievement of enrollees. In the analysis, academic achievement of MBA enrollees was modeled using a robust regression by GMAT scores obtained during admission to the program and student characteristics—gender, other qualification, year of completion and outcome of the bachelor's degree, and whether the candidate obtained his/her bachelor's degree from Makerere University. In the results, a high GMAT score was significantly associated with high academic achievement among graduate students. This evidence suggests that the theory of an aptitude or admission test being a predictor of academic achievement of learners holds across disciplines. However, a significant association established in the results between the academic achievement of learners at the undergraduate and graduate stages indicates that the undergraduate achievement can be recommended as a cost free alternative for assessing the competence of candidates suitable for admission to the graduate program.*

**Keywords:** Graduate Management Admission Test; Academic Achievement; Makerere University; Uganda

## INTRODUCTION

The Graduate Management Admission Test (GMAT) is an entry examination specifically designed to measure the comprehension and sentence correction, quantitative, as well as current affairs and business management skills of candidates for the Masters of Business Administration (MBA) program at Makerere University. The candidates are required to face a rigorous assessment of their abilities in the form of a carefully structured psychometric test. In light of the wide array of candidates from various academic background and/or disciplines at the bachelor's level, the GMAT is designed in such a way that it does not presuppose any specific knowledge of business or other specific content areas, nor does it measure achievement in any particular subject. Other than the GMAT, admission to the program is also based on a first degree or equivalent from a recognized university and qualification in any of the following professional programs: Association of Chartered Certified Accountants (ACCA), Certified Public Accountant (CPA), and Certified Investment Management Analyst (CIMA). Nevertheless, the decision of whether to admit a student to the program rests heavily

on GMAT outcomes. This suggests that GMAT outcomes are adopted as a measure of academic competence of candidates applying for admittance to the MBA program at Makerere University.

Bariez's (2002) educational study suggests that a person who has excelled academically in the past has a greater chance of successful performance in an examination. While this may be true to a certain extent, the reality is that many candidates with impressive grades in prior tests or examinations may score poorly on the entire GMAT or sections of the examination - comprehension and sentence correction, quantitative, as well as current affairs and business management. This suggests the weakness of adopting a total score on the GMAT as an accurate measure of academic competence of a candidate in undertaking graduate studies. On the contrary, a study of the College Admission Test (CAT) and Nursing Aptitude Test (NAT) for students at the University of Northern Philippines (UNP) in the period from 2006 to 2009 reveals that these examinations were predictors of academic performance among graduates at the University (Navarro, Vitamog, Tierra & Gonzalez, 2011). In particular, their results showed that students who performed well in the CAT and NAT tests of the UNP did the same in their final Nursing Board Examination. To this end, Gregory's (2004) study of using the outcomes of aptitude tests as predictors of success in occupational, training, and/or educational endeavors is highly supported.

In an extensive review of the literature, Navarro et al. (2011) present six qualities of individually administered aptitude tests: (i) excellent predictors of future scholastic performance, (ii) provide a method for comparing an individual's performance with that of others in the same situation, (iii) provide a profile of strengths and weaknesses, (iv) assess differences among individuals, (v) uncover hidden talents in individuals, thus improving their educational opportunities, and (vi) serve as valuable tools for working with handicaps. The first three qualities indicate the competence of individuals, which is positively correlated with academic performance (e.g., Bariez's, 2002; Bajet, 2001; Kaplan & Sacuzzo, 2001; Tolentino, 2010).

In Uganda's context, there is barely any documented evidence on the subject under investigation. GMAT outcomes are primarily used for admission purposes to the MBA program. In other words, the question of whether GMAT outcomes are accurate predictors of academic achievement, particularly among enrollees at Makerere University, remains unanswered. Although the results of the abovementioned related studies supports the theory that the GMAT outcomes are a predictor of academic achievement of learners, the question of whether this theory applies across disciplines remains unanswered. The fact that there is barely any documented evidence on the subject in Uganda is not a surprise since the GMAT was introduced to the College of Business Management and Science (CoBAMS) only in 2011—the 2012 enrollment cohort is only the second lot of enrollees at the CoBAMS to undertake the GMAT for admission to the MBA program of Makerere University. Thus, this study is essential in order to provide an explanation for the abovementioned questions. The findings of this investigation are intended to provide a platform for improving the quality of graduate programs in the CoBAMS of Makerere University.

## **DATA AND METHOD**

The investigations were based on the administrative data of applicants for the MBA program in the 2011 and 2012 cohorts in the CoBAMS of Makerere University in Uganda. From among 711 applicants for admission to the program, 516 applicants took the GMAT. The GMAT has three sections: comprehension and sentence correction, quantitative, as well as current affairs and business management scored by 30%, 30% and 40%, respectively. The maximum score in the GMAT was 100; candidates who scored above 50 were recommended for admission to the program. The CGPA of the enrollees during their bachelor's degrees and first year of master's studies was adopted as a measure of academic achievement. The analysis was performed in two stages. First, GMAT outcomes (GMAT score) and student characteristics (gender, nationality, other qualifications, year of completion and outcome of bachelor's studies, and whether the student obtained his/her bachelor's degree from Makerere University origin) were presented using summary statistics and frequency distributions. In addition, variations in the GMAT scores were investigated by candidate characteristics using the Kruskal-Wallis test, a non-parametric test. Second, the association between GMAT outcomes and the academic achievement of the enrollees was modeled using a multiple linear regression (MLR) controlling for student characteristics. Since ordinary least squares (OLS) in a MLR is an appropriate method for obtaining estimates if fundamental assumptions are met, which may not be the case in the data, a robust regression was used to take into account any abnormalities in the data, such as outliers, non-normality, multicollinearity, and missing data among others (Ho & Naugher, 2000). The estimates and/or

results may be misleading if the data do not satisfy some of the regression assumptions in an OLS. In other words, the robust regression is an important method for analyzing data that are contaminated with outliers. This statistical technique is able to cope with or detect outlying observations in the direction of both the dependent and explanatory variables (Alma, 2011; Birkes & Dodge, 1993; Berk, 1990).

## RESULTS

As stated earlier, 516 out of the 711 applicants to the MBA program of Makerere University in the 2011 and 2012 enrollment cohorts took the GMAT. The applicants who sat for the GMAT were predominately Ugandan by nationality (98.1%) and male (60.1%). Approximately three out of every four applicants (77.8%) obtained their bachelor's degrees from Makerere University, 20.1% from other Ugandan universities, and the rest obtained from international universities. Slightly more than half (52.6%) had lower second class bachelor's degrees, 44.4% upper second class, and the rest first class (2.1%), and "Pass" (0.8%) degrees.

### GMAT Outcomes

At this stage, the assessment is based on all 516 candidates who took the GMAT, with 100 being the maximum possible score in the examination. Table 1 presents summary statistics of the examination outcomes. A summary of the findings is presented in subsequent sections.

**Table 1: Summary Statistics of GMAT Outcomes**

Year of Enrollment	N <sup>a</sup>	Min.	Max.	Median
2011	260	32	89	61
2012	256	25	77	48

Note. The GMAT scores are assessed out of 100

<sup>a</sup> N represents candidates who took the GMAT

In the results shown in Table 1, the median score of the GMAT in 2011 was 61 (Range, 32–89), which suggests relatively good performances among the candidates in the enrolment cohort. As a matter of fact, the Kruskal-Wallis test to assess the differentials in the GMAT scores between candidates in 2011 and 2012 reveals better performance among candidates in the former enrollment cohort ( $\chi^2 = 19.3, p < 0.01$ ). Further analysis of the status of candidates for admission (GMAT score > 50) by enrollment cohort yielded a significant variation ( $p < 0.05$ ). In the assessment, the proportion of candidates suitable for admission to the program in the 2012 enrollment cohort reduced by a half (43.7%) when compared to the figure in 2011(87.7%).

GMAT outcomes were analyzed by candidate characteristics in order to ascertain whether the differences in scores were significant ( $p < 0.05$ ). The analysis was conducted using the Kruskal-Wallis Test based on all 516 candidates who sat for the GMAT in the 2011 and 2012 enrolment cohorts. The results are presented in Table 2 followed by a summary.

**Table 2: Assessment of GMAT Scores and Candidate Characteristics**

Candidate Characteristics	N <sup>a</sup>	Rank Sum <sup>b</sup>	Average Rank
<b>Gender</b>			
Female	207	43020.0	207.8
Male	310	90883.0	293.2
$\chi^2 = 40.5, p = 0.0001$			
<b>Academic Achievement [Bachelor's]</b>			
First Class	11	3703.0	336.6
Second Upper	228	64911.0	284.6
Second Lower	270	62158.0	230.2
Pass	4	1069.0	267.3
$\chi^2 = 19.9, p = 0.0002$			

Table 2: continued

<b>Prior Studies</b>				
	Makerere University	402	104326.0	259.5
	Other Ugandan University	104	26843.5	258.1
	International University	11	2733.5	248.5
$\chi^2 = 0.06, p = 0.9691$				
<b>Completion Year of First Degree</b>				
	Before 2004	93	29144.5	313.4
	2005–2009	300	81160.5	270.5
	After 2010	124	23598.0	190.3
$\chi^2 = 40.3, p = 0.0001$				
<b>Status of Other Qualifications</b>				
	No	350	90785.0	259.4
	Yes	167	43118.0	258.2
$\chi^2 = 0.01, p = 0.9319$				

Note. Analysis is based on all 395 candidates who took the GMAT in 2011 and 2012

<sup>a</sup>Sum of ranks generated in each of the categories following the Kruskal-Wallis Test

<sup>b</sup>Average rank is estimated by sum of ranks divided by number of candidates (N) in category of variable

Table 2 shows that there were significant variations in the GMAT outcomes or scores noted by candidate characteristics of gender, completion year, and academic achievement in their bachelor's degrees ( $p < 0.05$ ). In particular, high GMAT scores were noted among males, candidates who completed their bachelor's degrees before 2009, and those with first class and upper second class bachelor's degrees.

### Academic Achievement of Enrollees

As stated earlier, the academic achievement of graduate enrollees in the program was assessed using their CGPA after the first year of study in the program. The assessment after the first year of study is a good measure of academic achievement of enrollees in the program since the final CGPA score after the two-year stipulated period of candidature would not change significantly. Investigations related to academic competence were made only for enrollees in the 2011 commencement cohort. From among the 229 applicants who were recommended for admission to the program, 127 turned up for the course. In other words, 127 enrollees completed their first year of study in the MBA program of the CoBAMS at Makerere University. At this stage, the enrollees are expected to have almost completed all coursework related to the program—the remaining work toward their master's involves a research project that does not much change a student's CGPA. Table 3 provides the summary statistics of the academic competence of students.

Table 3: Summary Statistics of Enrollees' CGPA

Year of Enrollment	N <sup>a</sup>	Min.	Max.	Median
2011	127	2.17	4.67	3.61

Note. Summary statistics related to the CGPA obtained after the first year of study in the MBA program

<sup>a</sup>N represents enrollees who completed their first year of study in the MBA program

Overall, the median CGPA presented in Table 3 (3.61: Range, 2.17 to 4.67) suggests good performance of the enrollees. The low CGPA scores are, among other factors, attributed to retakes registered by some of the students during the course of their candidature—during the first and/or second semester of study. Slightly more than five out of every nine students in the 2011 enrollment cohort (56.3%;  $N = 70$ ) registered retakes. Of these enrollees ( $N = 70$ ), slightly more than half had retakes in the first semester of their first year in the program, followed by 34.3% in both the first and second semesters, and the rest only in the second semester (12.9%). Further analysis reveals that the highest proportion of retakes recorded is in Quantitative Methods (40.4%), followed by Operations Management (19.3%), Managerial Economics (14.0%), and Cost and Management Accounting (10.5%). With the exception of the Operations Management module which has both qualitative and quantitative aspects, the rest of the modules where enrollees registered retakes are entirely quantitative.

## GMAT Outcomes and Academic Achievement of Enrollees

As much as the outcome of the GMAT is an important measure in the admission process, its importance in explaining the academic achievement of enrollees in the program is debatable. To this end, the analysis in this section models academic achievement by GMAT outcomes and background characteristics of the enrollees. Table 4 presents the regression estimates made using a robust regression. The approach is aimed at providing resistant results or estimates in the presence of outliers or extreme values in the data. In particular, the approach deals with concerns regarding the failure to meet assumptions such as minor problems about normality, heteroscedasticity, or some observations that exhibit large residuals, leverage, or influence (e.g., Alma, 2011; Birkes & Dodge, 1993; Berk, 1990).

**Table 4: Regression Estimates of Academic Achievement of MBA Enrollees by their GMAT Outcomes and Characteristics**

Independent Variables	Coef. <sup>a</sup>	Std. Err	p-value
<b>Gender</b>			
Female <sup>†</sup>	.	.	.
Male	-0.041	0.081	0.608
<b>Academic Achievement [Bachelor's]</b>			
First Class <sup>†</sup>	.	.	.
Second Upper	-0.486	0.113	0.148
Second Lower	-0.787	0.132	0.000
<b>Prior Studies</b>			
Makerere University <sup>†</sup>	.	.	.
Other Ugandan University	0.073	0.089	0.416
International University	-0.443	0.132	0.236
<b>Completion Year of First Degree</b>			
Before 2004 <sup>†</sup>	.	.	.
2005–2009	-0.117	0.118	0.323
After 2010	-0.145	0.142	0.308
<b>Status of Other Qualifications</b>			
No <sup>†</sup>	.	.	.
Yes	0.016	0.098	0.871
<b>GMAT Score<sup>c</sup></b>	0.015	0.006	0.013
<b>Cons.</b>	3.305	0.439	0.000

Note. Estimates were obtained using a robust regression;  $N = 123$ ,  $F = 7.35$ ,  $p < 0.01$

<sup>†</sup> Represents the reference categories that were adopted

<sup>a</sup> Coefficients

<sup>c</sup> Represents total score on all sections of the GMAT

With regard to the assessment of the academic achievement of students after their first year of study toward the master's degree, presented in Table 4, significant associations were established with certain variables, namely, academic achievement at the bachelor's level and GMAT outcome ( $p < 0.05$ ). The results are summarized below.

- Students who had a high score on the GMAT also had a high CGPA.
- Enrollees who studied for the bachelor's degree at international universities had a similar CGPA compared to those who studied at Makerere University. No significant variations in CGPA are noted among enrollees from other Ugandan universities compared to those from Makerere University.
- High academic achievement of enrollees at the bachelor's level, represented by the CGPA, was associated with high academic achievement at the master's level. In particular, enrollees who obtained lower second class degrees had lower CGPAs compared to their counterparts who had first class degrees.
- No significant variation was observed in the academic achievement of enrollees with regard to student characteristics of gender, year of completion of first degree, and whether students had any other qualifications other than the bachelor's degree ( $p > 0.05$ ).

**DISCUSSION**

In the results, a high GMAT score was significantly associated with students who had demonstrated high academic achievement, as represented by their CGPA ( $p < 0.05$ ). The findings corroborate the literature that presents the outcome of the GMAT as a predictor of the academic achievement among learners in graduate programs (e.g., Navarro et al., 2011; Gregory, 2004). The consensus is that the outcome of an aptitude and/or admission test is a predictor of success in the academic endeavors of students. Nevertheless, the fact that slightly more than five out of every nine enrollees (56.3%) in the study registered retakes during the course of their master's candidature suggests that GMAT scores do not exhaustively explain the academic competence of a candidate in undertaking the MBA program at Makerere University. On the other hand, the fact that the highest proportions of retakes recorded in the study were in quantitative related modules suggests any or a combination of the following aspects: (i) adopting a total GMAT score is not a comprehensive measure for assessing applicants to the MBA program, (ii) candidates admitted to the program do not have the competence to excel in the subject area, (iii) the course content and/or its mode of delivery may not be appropriate for learners. Irrespective of the actual state of affairs with regard to the aforementioned issues of contention, the results suggest that admission requirements for the program should be revised in order to incorporate other aspects of student competence. On the other hand, the fact that quantitative aspects are examined in the GMAT, a balance score on all aspects of the examination would ideally be a better measure of competence of candidates suitable for admission to the program rather than focusing primarily on a high total score. Nevertheless, similar conclusions reached between nursing graduate students in the Philippines (Navarro et al., 2011) and Ugandan enrollees of MBA suggests that the outcome of admission or aptitude tests function as a predictor of the academic achievement of learners across disciplines. The same conclusions are more likely to hold across learners in various countries and/or universities.

However, significant associations established in the results for the academic achievements of learners at the bachelor's and master's levels water down the importance of offering the GMAT. Since the academic achievement of learners at the bachelor's and master's levels are positively related, as shown in the results, the use of the academic achievement of learners in prior studies would ideally serve as a good indicator of competence to excel in the program for which the applicant is applying. Since the overall goal of the assessment is to select students who are more likely to excel in their studies, as indicated by good academic achievement, the performance of a candidate at the bachelor's level would work as a basis for admission to a program such as the GMAT.

Surprisingly, it was found that qualifications acquired by candidates in addition to their bachelor's degrees were not related to any significant improvement in their academic achievement ( $p > 0.05$ ). The findings indicate the fact that the academic achievement of candidates at the bachelor's level is a good alternative measure of the competence of a candidate rather than additional qualifications attained by the candidate after the completion of the first degree. On the other hand, findings of no variation in academic achievement among students who studied for the bachelor's degree from Makerere University and other local universities compared with their peers from international universities suggests that the former possess a similar grounding in undertaking graduate programs at the University.

With regard to the year of completion of the first degree, no significant variations were noted in the results ( $p > 0.05$ ). The findings suggest no significant variation in academic achievement of learners with regard to their age. This is because enrollees who completed their bachelor's degrees before 2009 are more likely to be older than those who completed their studies in 2010 or later. Thus, the findings suggest that the age of a graduate student is not a predictor of academic achievement in graduate programs. Although the age of a graduate student was identified as a predictor of the timely completion of doctoral studies at Makerere University (Wamala, Oonyu & Ocaya, 2011), the variable is neither a predictor of timely completion of master's studies (Wamala & Oonyu, 2012) nor academic achievement of the studies as presented in the results of this study.

To this end, as much as the outcome of the GMAT is a predictor of the academic achievement of enrollees, it does not exhaustively demonstrate the academic competence of candidates with regard to a particular discipline. The academic achievement of learners at lower levels of learning (bachelor's degree) would be a cost-free alternative to the GMAT since it is a significant indicator of the potential of candidates in undertaking a graduate program.



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**REFERENCES**

1. Alma, O.G. (2011). Comparison of Robust Regression Methods in Linear Regression. *Int. J. Contemp. Math. Sciences*, 6 (9): 409 - 421
2. Bajet, J. A. (2001). The Integrated Nursing Comprehensive Licensure Examination Performance of the CHS, BSN, graduates of UNP (Unpublished Master's Thesis). University of Northern Philippines, Vigan City, Philippines.
3. Bariez, S.E.S. (2002). Analysis of the UNP College of Teacher Education Graduates' Performance in the Licensure Examination for Teachers (Unpublished Master's Thesis). University of Northern Philippines, Vigan City, Philippines.
4. Berk, R.A. (1990). A primer on robust regression. In J. Fox and J.S. Long (Eds.), *Modern Methods of Data Analysis* (pp. 292–323). Newbury Park, CA: Sage Publications.
5. Birkes, D. & Dodge, Y. (1993). *Alternative methods of regression*. John Wiley & Sons, Canada.
6. Gregory, R.J. (2004). *Psychological Testing*. USA: Pearson Education Group, Inc.
7. Ho, K. & Naugher, J. (2000). Outliers lie: An illustrative example of identifying outliers and applying robust models. *Multiple Linear Regression Viewpoints*, 26(2), 2–6.
8. Kaplan, R.M. & Sacuzzo, D.P. (2001). *Psychological Testing Principles, Applications and Issues*. USA: Brooks/Cole Publishing Company.
9. Navarro, R.T, Vitamog, A.T., Tierra, R.J.C, & Gonzalez, D.M.J. (2011). Predictors of Nursing Board Examination performance. *JPAIR Multidisciplinary Journal*, 6(1), 232–246.
10. Tolentino, L.S. (2010). Factors related to passing the Philippine Nurses Licensure Examination among Graduates of Tarlac State University. Proceedings of the Luzon Industry & Energy Research and Development Consortium (CLIERDEC) Regional Research and Development Symposium; Baliuag University, December 9, 2010
11. Wamala, R. & Oonyu, J. (2012). Completion time dynamics for master's and doctoral studies at Makerere University. *Contemporary Issues in Education Research*, 5(2), 131–137.
12. Wamala, R., Oonyu, J., & Ocaya, B. (2011). Completion time dynamics of doctoral studies at Makerere University: A hazard model evaluation. *Journal of International Education Research*, 7(3), 49–58.

**NOTES**