

Factors affecting the academic performance of real estate students in a specialized Federal University of Technology in Nigeria

Factors affecting the academic performance

177

Received 2 August 2019
Revised 15 October 2019
Accepted 28 November 2019

Ismail Ojetunde, Abass Iyanda Sule, Olurotimi Adebowale Kemiki and Isaac Ayodéle Olatunji

*Department of Estate Management and Valuation,
Federal University of Technology, Minna, Nigeria*

Abstract

Purpose – The purpose of this paper is to examine the factors affecting the academic outcome of real estate students in a specialized Federal University in Nigeria. Furthermore, this paper investigates the phenomenon of publication bias in the extant literature as such evidence poses severe threats to the validity of empirical findings on factors affecting the degree outcome of undergraduate students.

Design/methodology/approach – The standard statistical approach adopted was to examine whether the reported coefficient estimates from ten empirical studies (105 observations) are independent of their standard errors by employing both ordinary least squares (OLS) and weighted least squares (WLS). In this paper, this approach enabled evidence of publication bias in the cited literature to be refuted. In addition, data were also collected on the academic measure and demographic information of 449 students who graduated between 2005 and 2011. For the purpose of analysis, the study utilized a stepwise logistic regression technique to examine the factors impacting on the degree outcome of real estate students.

Findings – The results of the OLS and WLS regression indicate that there is no significant evidence of any empirical effect of publication bias in the extant literature. The results of the logistic regression also revealed that grade point average, gender differences, prior knowledge of real estate discipline and potential difference in year of enrollment impact on students' academic performance in terms of their ability to graduate at first attempt. In addition, factors such as age, marital status, high school grade and geopolitical/ethnic background of undergraduate real estate students do not influence their opportunities to graduate at first attempt from the university.

Research limitations/implications – This paper focuses only on one specialized university of technology offering a bachelor's program in real estate in Nigeria, so as to remove any extraneous factor(s) that could be present in the other institutional settings where students have completed such program. Extending similar study to tertiary institutions in Nigeria that share similar geographical characteristics and institutional settings can produce far-reaching generalization.

Originality/value – This paper contributes to the scanty literature on factors affecting the academic performance of students in an undergraduate real estate program in Nigeria. A scientific element of novelty in this paper is the evidence of the absence of the underlying effect of publication bias in the extant literature on students' academic outcome in tertiary institutions. Findings from this study serve as the basis for university officers to monitor significant transitions in real estate students' academic progress, so as to identify those who are unlikely to graduate at first attempt early at the entrant level. Generally, the outcome of this research could provide faculty and admission officers in tertiary institutions with complementary information in arriving at an informed decision in a non-discriminatory admission process.

Keywords Gender, Property, Real estate, Curriculum development, Academic performance, Federal University, Nigeria

Paper type Research paper



1. Introduction

Low quality of knowledge acquisition in higher institutions by would-be graduates has kindled a growing concern on students' academic performance. Such concern has been heightened by the demand that students upon graduation must meet the modern needs of

their employers and the industry. From an employer's perspective, substantial proportion of real estate graduates lack the competencies (skills, attributes and knowledge) required to be successful property professionals in the interdependent real world (Poon *et al.*, 2011; Poon and Brownlow, 2014; Manning and Eply, 2006; Tu *et al.*, 2009). As aptly stated by Barrie (2006) these competencies transcend but include the disciplinary expertise and technical knowledge that traditionally formed the core of most university courses. The real estate profession in Nigeria is not without its fair share of this arching trajectory of the competency gap which hitherto has been linked with students' academic performance and outcome in tertiary institutions. For instance, studies have shown that in real estate practice, graduates who were deficient in core knowledge courses taught while in the universities were unable to meet the needs and expectations of the industry (Ayodele *et al.*, 2016; Oloyede and Adegoke, 2007). Poor academic performance of students poses severe consequences to both the university and the industry. Poor university ranking and inability of the program to scale the hurdles of professional recognition requirements of accrediting agencies (Newell and Mallik, 2011; Nonis and Wright, 2003) and low standard of professional practice necessitating the need for retraining of graduates (Nonis and Wright, 2003) are some of the recurring concerns of poor academic performance.

In the literature, prior studies have explored factors affecting the academic performance of real estate students at college and university level. From an international perspective, useful evidence of these studies is limited to Allen and Carter (2007) and Huffman (2011) both in the USA and Newell and Mallik (2011), Yam and Rossini (2012) and Lee and Mallik (2015) in Australia. In Nigeria, notable contributions to this existing body of the literature are recent and location specific. Most of these studies have investigated the academic performance of real estate students through the effects of socioeconomic, gender variation and academic background (Ayodele *et al.*, 2016, 2017; Olatunji *et al.*, 2016; Peter *et al.*, 2016). Others have examined the academic progress of real estate students in the individual subject using grade earned in other co-requisite subjects (Ataguba *et al.*, 2017). However, there is no clear-cut consensus among all these representative articles about the factors impacting on real estate students' degree outcome at the undergraduate level.

While virtually all the studies are limited to tertiary institutions in the southwest geopolitical region of the country, they differ considerably in terms of the variables considered as measures of academic performance, and the ways these variables were operationalized. Though different findings as evident from such empirical investigations may not be far from realistic, such results should be further explored to determine whether they are espoused in different university setting sharing different geographical characteristics. This is the research gap which necessitates this current study. From a purely different methodological perspective, the empirical analysis in this present study utilized a stepwise logistic regression technique to examine factors affecting the academic performance of real estate students who graduated at first attempt in a specialized university of technology domiciled in the northern part of the country. In terms of analysis, this approach enabled us to empirically provide evidence of such *a priori* existence among undergraduate real estate students in the university. A tenable justification for this approach stems from the fact that prior academic achievement is the best predictor of future academic outcome among students (House *et al.*, 1996; McKenzie and Schweitzer, 2001; Zeegers, 2004).

Against the backdrop of the foregoing, the present paper contributes to the current strand of the literature on factors affecting the academic performance of students in undergraduate real estate program, and to Nigeria in particular. The objective of this paper is two-fold. First, we examined the presence of publication bias due to lack of consensus in the extant literature and then proceed to analyze the factors affecting the academic performance of real estate students who are likely to graduate at first attempt in a specialized Federal University of Technology in Nigeria.

2. A review of the literature

2.1 Factors affecting the academic performance of undergraduate students

Studies in the published literature have examined an array of factors which affects the academic performance of undergraduate students in different disciplines. Focusing on gender, previous research by Schrouder and Rhodd (2013) provided evidence that female students were 16 percent more likely to graduate with higher-grade point averages than their male counterparts in the university. Similarly, Win and Miller (2005) reported that females have comparatively little academic advantage of around 2 percent over male students. Zwick (2012) also found that female students performed significantly better than male students during the 2003/2004 academic year in all Bavarian public universities and universities of applied sciences in Germany. Richardson *et al.* (2012) meta-analysis of 7,167 studies over the period 1997–2010 also concluded that females were found to be academically better in terms of achieving higher grades.

Salamonson *et al.* (2013) found contrary evidence when empirically modeling the determinants of academic performance of 919 first-year students across five health and science disciplines. They reported that male students achieved significantly better grades than female students across all the disciplines. The recent study of Mallik and Shankar (2016) investigated the performance characteristics of 2,187 students enrolled in first-year principles of economics subject and concluded that male students significantly outperformed female students. They, however, argued that males performed much well only in multiple choice questions. Opstad and Fallan (2010) analyzed gender effect and personality type as factors of academic success of 295 second-year students enrolled in Trondheim Business School for a principle of macroeconomics course and revealed that female students achieved significantly lower grades than their male peers. In line with Opstad and Fallan (2010) study, Graunke and Woosley (2005) examined factors affecting the academic success by utilizing a cohort of 1,023 college sophomores enrolled at midwest public university in the USA and reported that being a female was a negative significant predictor of spring and fall grade point average ($p < 0.01$). Borg and Shapiro (1996) and Ziegert (2000), however, found a weak influence of gender effect on the performance of students in macroeconomics courses. As a corollary to the earlier research of Allen and Carter (2007) which surmised that being a female was not a factor of overall academic success of students in real estate discipline in the USA, the empirical findings in Huffman (2011) indicated that being a male was highly correlated with students' performance in an advanced undergraduate real estate course in the same geographical setting. Yam and Rossini (2012) also examined the effectiveness of pure web-based and blended learning approaches between 81 internal and 17 external students enrolled in an introductory property course (property valuation) during the first year of the program. The study nonetheless showed that being a female had no significant effect on the overall course mark and total examination mark in the property valuation course.

The study of Al-Mutairi (2011) examined the determinants of students' performance at the Arab Open University in Kuwait by utilizing multiple regression analysis. The findings of the study indicated that gender and marital status were among the factors affecting the grade point average of the students. However, Gardy and Akbay (2015) found that marital status was not a significant predictor of second, third- and fourth-year students' academic performance across the five faculties (law, art, education, science and engineering) at the Soran University in Northern Iraq.

Nyikahadzoi *et al.* (2013) reported an inverse relationship between age and grade earned in accountancy at the University of Zimbabwe ($p < 0.05$). Chan *et al.* (1997) examined the determinants of academic performance of 56 students in principles of finance at a mid-western regional state university but found that age is not a significant determinant of course grades. Some studies have nonetheless found that for every year increase in students' age, their course

grades in the university increase by 2–4 percent (Didia and Hasnat, 1998; Schrouder and Rhodd, 2013). The study of Rhodd *et al.* (2009) concluded that older students have no significant effect in explaining performance in business undergraduate program. However, their findings were peculiar to those students with a wealth of experience. Donaldson and Graham (1999) emphasized that older students performed well or even better than younger students during their academic careers based on their grade point average, aptitude or content-based examinations. They argued that these mature students performed exceptionally better than younger students because they were more able to integrate new learning by reflecting on their rich personal experience and previous knowledge.

A study conducted by Kanagi *et al.* (2015) employed multinomial logistic regression to investigate factors of academic performance in first-year undergraduate students at the University of Malaya, Malaysia. The study revealed that ethnic background was an insignificant determinant of students' cumulative grade point average. Vars and Bowen (1998) showed that students of white ethnic background achieved higher college grades than black students, even after controlling for other covariates like high school grades and family socioeconomic background. Research on the degree outcomes in UK higher education indicated that students of white ethnic background were more likely than other minority students (who were Asian, black, mixed or Chinese) to achieve first or upper second-class degrees (Fielding *et al.*, 2008; Richardson, 2008). Their findings further echoed the much earlier work of Vars and Bowen (1998), as they concluded that white students still achieved a higher class of degree than students from all the minority ethnic groups, even after adjusting for some confounding variables.

Newell and Mallik (2011) employed OLS to analyze the grade point average of 295 property graduates at the University of Western Sydney in Australia using multi-year data between 2006 and 2012. The findings from the study identified prior background in mathematics as a potential factor of students' academic success in both individual property courses and property degree level. Similarly, Lee and Mallik (2015) examined the effects of student characteristics on academic achievement using 126 external students who completed an online undergraduate property program at the University of Western Sydney. In their study, neither prior knowledge in general mathematics nor higher level mathematics at Higher School Certificate (HSC) was found to be an important factor of academic success in the undergraduate property degree program. Rhodd *et al.* (2009) investigated factors of academic success for undergraduate business students in nine-degree majors from the year 2000 to the year 2007. Grades earned in knowledge courses (principles of economics courses) were reported as good predictors of overall academic success of undergraduate business majors. A specific investigation by Raehsler *et al.* (2012) found that increment in the average score of students in two pre-requisite mathematics courses (pre-calculus and calculus) was associated with the higher performance of 1,452 business students in a financial management course at a rural university in the Eastern USA.

The earlier study of Didia and Hasnat (1998) employed ordered probit technique and ordinary least square (OLS) to examine the determinants of student's grade in introductory finance course at the State University of New York at Brockport. Their research showed that prior grades earned in economics, accounting and mathematics explained some of the variations in students' academic performance. Consistent with the vast literature on students' academic performance (such as, Raehsler *et al.*, 2012; Yang and Raehsler, 2005) the study of Brahmasrene and Whitten (2001) revealed that private accounting experience was a strong predictor of academic performance of candidates in Certified Public Accountant examination. Aluko *et al.* (2016) employed discriminant analysis and K-nearest neighbor analysis to investigate the academic success of architecture undergraduate program at Olabisi Onabanjo University in Nigeria. The study concluded that Joint Admission Matriculation Board of Nigeria (JAMB) entry score, direct-entry route into the university

and prior academic achievement in mathematics, physics and chemistry were the strongest predictors of academic success in architecture undergraduate program between the year 2011 and the year 2014.

2.2 Factors of academic performance of undergraduate real estate students in Nigeria

In the Nigerian context, evidence of the academic performance of real estate students in the literature is recent, relatively scarce and skewed to a particular geographical setting. For instance, Ataguba *et al.* (2017) explored the explaining influencing of grades earned in first- and second-semester co-requisite courses on the performance of 478 Higher National Diploma (HND) Estate Management students in property development courses in Nigeria, though their study was restricted to students in a federal polytechnic and not universities. They applied an unrestricted and pooled OLS regression to data obtained for 2007/2008–2014/2015 session. For the first semester courses, findings based on the pooled OLS showed that grades earned in four of the six co-requisite subjects offered by the students account for approximately 48 percent variation in scores obtained by these same students who took property development course in the first semester ($p < 0.01$). In the second semester, five of the six co-requisite courses significantly explained 54 percent of the variation in students' academic performance in property development. The results of the unrestricted OLS regression further showed that two co-requisite courses (valuation and estate accounting) significantly have the most explaining influence on the grade earned in property development courses over the eight-year study period.

Although the study provided for diagnostic tests of the underlying assumptions of the classical regression framework, it potentially ignored the temporal stability of the estimated regression model. This weakness of the study to isolate the influence of time on the grade earned in the property development course might lead to an estimation of unstable regression coefficients, and hence a spurious result. Furthermore, the stratification of the sample of 478 students when estimating the unrestricted regression nonetheless make the sample size fairly small for meaningful generalization.

The much recent study by Akinbogun (2018) analyzed the impact of at least a compulsory pass in physics offered at senior secondary school examination on undergraduate admission into real estate management program, and the requisite skills for practice in Nigeria using Analysis of Variance (ANOVA) framework. While the study is limited by the sample size of the universities selected in the southern part of Nigeria, the findings implied that a compulsory pass in physics constitutes a clog in the wheel of students' admission into the tertiary institutions, and by extension, impacting negatively on the academic and professional career progression of prospective real estate management students in Nigeria. Olatunji *et al.* (2016) conducted a survey of undergraduate students in order to research on their academic performance in construction-related disciplines. Questionnaires were administered to 553 students in four departments (Estate management, Quantity surveying, Architecture and Industrial design) at Federal University of Technology Akure using convenience sampling, but a 31 percent actual response rate was achieved. The survey result indicated that 80.30 percent of the respondents considered CGPA as an important predictor of academic success in construction-related courses. In this study, the respondents were also asked to rank 32 identified factors influencing their academic performance based on a five-point Likert scale from 1 (strongly disagree) to 5 (strongly agree). The results of the Kruskal Wallis test of difference in mean showed that all the respondents were in total agreement that their opinion on these factors was the same, and therefore not due to any sampling oddity ($\chi^2 = 41.42, p < 0.01$). Based on the mean score rating of the factors, a segment of the respondents who were real estate students cited concentration, lack of reading habit and reading plan, fear, class size and peer group as the five most important factors impacting on their academic success in the discipline.

The specific study of Ayodele *et al.* (2016) examined the factors affecting the academic performance of 152 real estate students in two of the three federal universities offering real estate bachelor's program in Southwestern Nigeria. Based on their literature review, an array of 35 factors grouped into six areas (family background, students' personal factors, academic environment, teaching techniques, lecturers and mode of assessment) were identified as affecting students' academic performance. Based on a questionnaire survey, the respondents were asked to rank on a seven-point scale, the factors which they perceived as contributing to their academic performance. Along the six thematic lines, findings from the study showed that factors relating to the mode of academic assessment and family background have more impact on students' academic performance. The study also employed factor analysis to examine the statistical dimension of a data set consisting of the 35 factors which were identified as impacting on the students' academic outcomes. The results of the multivariate analysis indicated that, in total, three components accounted for 37.015 percent of the total variation in the students' academic performance. The first component which accounted for the largest percentage (16.503 percent) of the variation out of the three components was labeled teaching techniques and lecturers' skills and attitude. The second component explained 13.833 percent of the variance, and was grouped as personal factors and parental/family background. While the third component which contributed only 6.679 percent of the total variation attributable to factors affecting real estate students' academic performance, was classified as mode of teaching and assessment.

The study of Peter *et al.* (2016) analyzed gender differences in the class of degree attained by students in Covenant University – a private university in the southwestern part of Nigeria. The sample was a cohort of 100 real estate students (37 female and 63 male) enrolled in the 2011 academic year until 2015. Based on their CGPA, findings from the study showed that female students performed better than their male counterparts on a semester and year-on-year basis between 2011 and 2015. As a corollary, the authors argued that female students tend to attain higher academic success because they were more focused and placed more importance on education than male students. Furthermore, the study concluded that the negative perception that real estate discipline required less academic rigor was the principal reason for the poor academic performance of male students. In a follow-up study to the earlier work of Ayodele *et al.* (2016), the article by Ayodele *et al.* (2017) examined the effects of gender variation, socioeconomic and academic background as factors influencing real estate students' academic performance in Nigeria. The sample comprised 152 final year real estate students from two federal universities in the southwestern part of Nigeria. While the data employed in the study were indistinguishable from the data used in Ayodele *et al.* (2016) study, the analytical framework used was different and involved the use of item-to-total correlation, ANOVA and independent *t*-test. As a significant departure from Peter *et al.* (2016) study, findings from the results indicated that male students academically outperformed female students due to their personal interest in the real estate discipline. In the study, the authors reported that the initial reluctance by female students due to the inability to enroll in their desired choice of discipline might have negatively influenced their academic performance.

To further examine the effects of factors impacting on real estate students' academic performance, 35 factors grouped into 6 different thematic areas (family background, students' personal factors, academic environment, teaching techniques, lecturers and mode of assessment) were identified in the literature. Findings from the research showed that academic background of the respondents such as the influence to study real estate, likely performance in the preferred course and knowledge about real estate were statistically significant in three thematic areas of personal factors, family background and teaching techniques, respectively. However, mode of admission (pre-degree, UTME and direct entry) was not statistically different from 0 at 95 percent probability level across all thematic areas

($p > 0.328$). The study also addressed the potential effects due to the socioeconomic variation of the respondents along gender lines and found no statistically significant impact on academic performance based on the identified thematic areas. Finally, based on the results of the independent *t*-test, the study concluded that except for availability of finance and preference by lecturers for memorized concepts rather than understanding, there was no significant difference between the ratings of both genders, in terms of the 35 identified factors influencing their academic performance.

The review of the foregoing desktop literature points to mix conclusions as differential findings in degree outcomes of students exist across disciplines and individual courses. In view of this review, the fundamental question is: can such conclusions in our extant literature have occurred by random chance or most researchers were biased and selectively report findings which are consistent with some conventional beliefs? The existence of publication bias presupposes that most researchers have the predisposition to selectively report positive estimates which are consistent with some prior beliefs (Stanley and Doucouliagos, 2014). Over-representation of such estimates in most journal publications tends to distort literature review and by extension poses severe threats to the validity of empirical knowledge (Borenstein *et al.*, 2009; Lipsey and Wilson, 2001; Stanley and Doucouliagos, 2014). Against this background, this paper first contributes to this strand of research by testing for publication bias in the extant literature and then proceeds to examine the factors affecting the academic outcomes of real estate students.

3. Data and methodology

3.1 Data source and preprocessing

The data for this study were collected for the bachelor's degree program, from the Department of Estate Management and Valuation at the Federal University of Technology Minna. The university is a specialized university of technology in the north-central part of Nigeria offering undergraduate real estate program. Its undergraduate program is rigorous from both academic and professional perspectives, and the university has consistently been the largest providers of real estate graduates serving a sizeable proportion of the northern part of Nigeria. To be eligible for graduation, students must first enroll in the degree program either through remedial, Unified Tertiary Matriculation Examination (UTME) or direct-entry route. Students enrolled through the remedial route are deemed deficient in the requisite entry qualification (senior secondary school result or its equivalent) into the university. However, they are provided the platform by the university to remedy their deficiencies and, must pass the Unified Tertiary Matriculation Examination (UTME) before being admitted into the undergraduate real estate program by the JAMB. On the other hand, UTME students are category of students assessed to have the requisite entry qualification (senior secondary school result or its equivalent) and must have passed the Unified Tertiary Matriculation Examination (UTME) conducted by the JAMB before being enrolled into the undergraduate real estate program. Entrants through the direct-entry route are national diploma and HND holders in Estate Management and Valuation from the polytechnics, who are absorbed by JAMB directly into either second- or third-year undergraduate real estate program in the university, without having to take the Unified Tertiary Matriculation Examination (UTME).

Admitted students through remedial and UTME routes must have accumulated a total of 183 credit units of course work over a period of 9 semesters provided they would graduate at first attempt. While HND and National Diploma holders from polytechnics through direct-entry route must spend a minimum of 5 and 7 semesters for them to equally graduate at first attempt and must have accumulated 89 and 133 credit units of course work, respectively. The maximum time for graduation for remedial and UTME students who failed to graduate at first attempt is 15 semesters while that of the direct-entry students who have HND and National Diploma is 9 and 11 semesters, respectively.

The data collected entailed general record on students' academic measure and demographic information who graduated between 2005 and 2011 (Students' records for the 2007 academic year were not available for the purpose of this study). Since the purpose of this research is to investigate the factors impacting on the degree outcome of real estate students, we analyzed 449 graduates who graduated from the bachelor's program within this time-frame. The choice of the investigated variables selected from the academic records made available by the Department was premised on three criteria: the relevance of the factors that have been found in the literature to determine academic degree outcome; the likelihood of exploring other factors that were not included in the extant literature, but were available in the data set for our analysis and the availability of the data in measurement scales which are amenable to statistical analyses. After dropping missing records, the 3 criteria yield 8 sample items with a sample population of 405 graduates.

The eight sample items from the students' records were assessed for content validity so as to reflect the extent to which these sample items as a whole can be considered relevant, comprehensive and constitute an adequate definition of the construct (Haynes *et al.*, 1995; Polit and Beck, 2006; Saw and Ng, 2001; Shrotryia and Dhanda, 2019). To assess the content validity of the sample items, we selected six domain experts who were all academicians at the Federal University of Technology Minna. The selection criteria were based on their expertise and vast years of experience in real estate discipline. The experts were asked to give their unbiased expertise judgment on whether the items were taken from specific content domain relevant to the measurement of student academic performance. As suggested by Shrotryia and Dhanda (2019) a four-point rating continuum (1 = not relevant, 2 = somewhat relevant, 3 = quite relevant and 4 = very relevant) was used to elicit the responses of these experts, so as to avoid a neutral point. A rating response of 1 or 2 by the experts was deemed "content invalid" while rating response of 3 or 4 was considered "content valid" (Wynd *et al.*, 2003). In quantitative terms, the responses/viewpoints of the six domain experts were computed using the Content Validity Index (CVI) and κ statistic.

In computing the CVI, both the individual item-content validity index (I-CVI) and the overall scale content validity average (S-CVI/Ave) were calculated. While the individual (I-CVI) reflects the proportion of the total number of experts that provided a rating of 3 or 4, the (S-CVI/Ave) emphasizes average item quality and is computed by averaging all the individual (I-CVI). As shown in Table I, the I-CVI for the eight items ranged from 0.833 to 1.00 while the overall S-CVI/Ave for the eight-item scale was 0.938. This reported CVI

Table I.
Ratings on a eight-item scale for "academic performance construct" by six experts (Items rated 3 or 4 on a four-point relevant scale)

S/No.	Variables	Expert 1	Expert 2	Expert 3	Expert 4	Expert 5	Expert 6	Number of expert in agreement	I-CVI	Pc	Koppa	
1	Age	x	x	x	x	x	x	6	1.000	0.016	1.000	
2	Marital status	x	x	x	x	x	x	6	1.000	0.016	1.000	
3	Grade point average	x	x	x	x	x	x	6	1.000	0.016	1.000	
4	Gender	x	-	x	x	x	x	5	0.833	0.094	0.816	
5	Ethnic background/ Geo-political zone	-	x	x	x	x	x	5	0.833	0.094	0.816	
6	Prior background	x	x	x	x	x	-	5	0.833	0.094	0.816	
7	High school grade	x	x	x	x	x	x	6	1.000	0.016	1.000	
8	Year of entry	x	x	x	x	x	x	6	1.000	0.016	1.000	
		S-CVI (average)								0.938		

Notes: S-CVI/Ave = 0.938. I-CVI = item content validity index; Pc = probability of chance agreement on relevance

pointed to a very high content validity of the items as a construct of academic performance (see, Rubio *et al.*, 2003; Polit and Beck, 2006; Zamanzadeh *et al.*, 2015).

Furthermore, to ensure that the level of agreement among the six domain experts was beyond random chance, a consensus inter-rater agreement as advocated by Wynd *et al.* (2003), which is known as κ statistic was computed in addition to the CVI. κ statistic can be calculated as $\kappa = [1 - CVI - Pc] / [1 - Pc]$, and required the computation of the probability of chance agreement on relevance (Pc). The probability of chance agreement on relevance for any binomial random variable can be computed as $Pc = [N! / A!(N-A)!] \cdot 0.5^N$. In this case, N = number of experts selected while A = number of the expert who agrees that the item is relevant. As the κ values were positive and ranged from 0.816 to 1.00 for the eight items, this reflected a very high level of agreement among the experts regarding their inclusion as constructs of students' academic performance. Finally, the overall item scale was examined for reliability using Cronbach's α test. Based on a five-point Likert scale (1 – strongly disagree to 5 – strongly agree), responses on the internal consistency of the scale were sought from a cohort of 115 out of 164 final year real estate students who enrolled during the 2014/2015 session. This sample of 115 final year students was determined using the Krejcie and Morgan standard formula in the following equation:

$$n = \frac{Z^2 \cdot N \cdot [P \cdot (1-P)]}{[ME^2 \cdot (N-1)] + [Z^2 \cdot [P \cdot (1-P)]]}, \quad (1)$$

where n is sample size to be determined; Z has a corresponding value of 1.96 at 95% confidence level; N is the total population (164 final year students); P is the standard deviation of the total population (which in this case is 0.5) and ME is the margin of error that can be tolerated (5 percent). The estimated Cronbach's α reliability coefficient of 0.88 was considered very satisfactory as it surpassed the acceptable level of 0.70. This degree of reliability showed that the eight items represent a well-established scale which measures students' academic performance and that no removal of any of the items would enhance this reliability measure.

Based on the validity and reliability of the eight sample items as good construct of students' academic performance, the information for each student in the final sample was coded and operationalized as follows: degree outcome (student graduated at first attempt) is the dependent variable (takes a binary value of "1," and "0" if otherwise). The explanatory variables considered for inclusion were: Age (student's age on enrollment) is a continuous numerical variable. GPA (student's grade point average at graduation) is ranked on a continuous scale of 1 to 5; gender (takes a value of "1" for a female student, otherwise "0," with a male as the omitted reference group). Marital status at time of admission (takes a value of "1" if the student is single and "0" if otherwise, with married as the omitted reference category); high school grade (takes the value of "1" if the student is not deficient in entrance grade, "0" otherwise, with deficient as the omitted reference category). Prior knowledge takes values from 1 to 3 for remedial, UTME and direct-entry students (remedial students is the omitted category). Geopolitical background variable also takes values of 1 to 7 if the student is from FCT, North-Central, North-East, North-West, South-West, South-East and South-South (with FCT as the omitted reference category). We also capture the systematic differences in academic performance based on the student's academic year of entry into the university (with the exclusion of the year 2002, students were enrolled between the year 2000 and 2006) by introducing year dummies (with the year 2000 as the omitted reference category).

3.2 Research methods

The methods of analysis employed in this study are in two categories. In quantifying publication bias of the extant literature scatter graph, OLS and weighted least squares

(WLS) were employed. While simple descriptive statistics and a stepwise binary logistic regression were utilized in analyzing the factors impacting on students' academic performance.

3.2.1 Quantifying publication bias. Inferential statistical techniques were adopted to analyze the data collected on publication bias for the study. Scatter graph, OLS and WLS regression were used to test for evidence of publication bias in 105 observations from 10 empirical studies cited in the literature. While several approaches have been employed in the literature to deal with publication bias, cognizance is given in this study to these three approaches as they are the most practical, established and commonly used (Sterne *et al.*, 2000; Moreno *et al.*, 2009; Idris, 2012). The standard test for publication bias is to examine as a pooled estimate the relationship between the reported effects (coefficient estimates) of the empirical studies and their standard errors. When publication bias is present, the reported effects will be positively correlated with their associated standard errors. In the absence of such bias, the reported effects are independent of their standard errors. Statistically, the relationship between the reported estimated coefficients and their precision (denoted by their standard errors) would be positive and suggests publication bias, if the statistical threshold value of the reported *t*-statistic equal or just exceeds 2.

The choice of the three methods (scatter graph, OLS and WLS) for detecting publication bias is to enhance the credibility of the research findings on such phenomenon. This triangulation of methods provides a corroborating and more balanced evidence of the prevalence of publication bias, as no single method is precisely better than others under all conditions (Kepes *et al.*, 2012; Coburn and Vevea, 2015; vanAert *et al.*, 2019). For instance, while scatter plot is noted for its simplicity in assessing publication bias, the subjective nature of its visual assessment represents its major drawback (Light *et al.*, 1994; Doucouliagos and Paldam, 2009; Idris, 2012). Evaluating publication bias using linear approximation such as OLS has higher statistical power (Sterne *et al.*, 2000), nonetheless it suffers from heteroscedasticity, and has low statistical power to detect publication bias for small sample size (Egger *et al.*, 1997; Stanley, 2008; Stanley and Doucouliagos, 2014; vanAert *et al.*, 2019). Though, the WLS regression avoids the problem of heteroscedasticity and reduces the over-estimation caused by small-study effects (Stanley and Doucouliagos, 2014), it is susceptible to bias when the sample size of the empirical studies included in the analysis is similar (Stanley, 2017; Alinaghi and Reed, 2018).

3.2.2 Stepwise binary logistic regression technique. Apart from descriptive statistical tools such as mean, standard deviation, frequency count and percentage which were employed in describing the academic measure and other demographic patterns in the sample, the factors impacting on the degree outcome of real estate students were analyzed by utilizing a stepwise binary logistic regression technique. The measurement of degree outcome calls for the application of an econometric model beyond the OLS regression, which traditionally has been the most employed multivariate technique to predict academic performance (Peng, Lee and Ingersoll, 2002; Ayan and Garcia, 2008). As mentioned by Tabachnick and Fidell (2001) logistic regression rather than the OLS is useful in predicting a dichotomous outcome when the independent variables are a combination of discrete, dichotomous and continuous variables. The classical OLS regression has been found to be limited and less suited to provide explanation for the relationship between a dichotomous outcome and a series of continuous and categorical covariates (Greene, 2002; Peng, So, Stage and St John, 2002; Ayan and Garcia, 2008). Where the dependent variable is dichotomous, the OLS is restrictive as it violates the assumptions of linearity, normality and homoscedasticity upon which its statistical estimation is based (Ayan and Garcia, 2008; Peng, So, Stage and St John, 2002; Tabachnick and Fidell, 2001, p. 521). As aptly noted by Greene (2002), the nature of the observed data which is a dichotomous dependent variable dictates a special treatment using a binary choice model. Given that the variable of interest

(degree outcome of real estate students which takes a value of either 0 or 1) is dichotomous, binary logistic regression is the most ideal statistical analysis. Logistic-based regression has increasingly been seen to have wide application in educational research, especially for predicting academic success/failure (Peng and So, 2002a, b; Jaeger and Hinz, 2008). Apart from being more robust in terms of the inferences, the logistic regression compared to the familiar OLS is flexible, as it does not require the variables to meet the stringent assumptions of the OLS (Tabachnick and Fidell, 2001; Greene, 2002; Peng, Lee and Ingersoll, 2002; Ayan and Garcia, 2008).

The relation between our dichotomous dependent variable and a series of multiple continuous and categorical covariates can be modeled using the following generalized logistic regression (Greene, 2002; Peng, Lee and Ingersoll, 2002):

$$\text{logit}(Y) = \ln \left[\frac{\pi}{1-\pi} \right] = \alpha + \beta_1 X_1 + \beta_2 X_2 + \dots + \beta_n X_n. \quad (2)$$

In Equation (2), logit is the natural log (ln) of Y (the degree outcome of students, which takes a binary form). π is the probability of the occurrence of Y , such that a student graduate at first attempt. α is the constant of Y while β 's are the coefficients of the regression. X s are the vector of the eight regressors or covariates (GPA, age, gender, marital status, prior knowledge, year of entry, high school grade and ethnic/geopolitical background). For simplicity of exposition, if the antilog of both sides of Equation (2) is taking, the probability of a student graduating at the first attempt given the values of the covariates can be given as seen in the following equation:

$$\pi = \frac{e^{\alpha + \beta_1 X_1 + \beta_2 X_2 + \dots + \beta_n X_n}}{1 + e^{\alpha + \beta_1 X_1 + \beta_2 X_2 + \dots + \beta_n X_n}}, \quad (3)$$

where, e is the exponential under the logistic approach and represents the base of natural logarithms ($e = 2.71828$).

For this analysis, the choice of the binary logistic regression type is the stepwise procedure which utilized a sequential search approach to identify the best set of covariates from a variety of variables based on their statistical significance (Hosmer and Lemeshow, 2000; Tabachnick and Fidell, 2007). This confers parsimony on such logistic model as the variables may change in statistical significance in subsequent stages of analysis. By fitting this stepwise binary logistic regression to the sample data, the regression coefficients of these covariates are estimated through an iterative maximum likelihood method.

4. Findings and discussions

The findings and discussions of the analysis are in two folds based on the objectives of the study. The first part presented the results of both scatter graph and regression-based statistical tests on the evidence of publication bias in the extant literature on undergraduate real estate students' academic performance as shown in Section 4.1. The second part as provided in Sections 4.2 and 4.3, respectively examined the factors affecting the academic outcome of real estate students.

4.1 Evidence of publication bias

Table II presents the characteristics summary of the ten empirical studies for which publication bias was examined.

The scatter graph of the reported estimates and their respective standard errors for the 105 observations from these studies is presented in Figure 1.

Table II.
Characteristics of
studies included in the
publication bias test

S.No.	Author/year	Study period	Sample	Variable	Discipline	School	Country
1	Lee and Mallik (2015)	2007–2012	126	Entry qualification, gender, age, prior grades (general math, math and economics)	Online real estate	University of Western Sydney	Australia
2	Graunke and Woosley (2005)	2002	1093	Gender and ethnic background	na (across all disciplines offered in the university)	Midwest public university	USA
3	Allen and Carter (2007)	2000–2005	74	GPA, age, gender, year, core knowledge courses	Real estate	Florida Atlantic University	USA
4	Nyikahadzoi <i>et al.</i> (2013)	2010–2011	200	Gender and entry qualification	Accountancy	University of Zimbabwe	Zimbabwe
5	Gardy and Akbay (2015)	2015	400	Age, high school grade, gender and marital status	Law, art, education, science and engineering	Soran University	Iraq
6	Schrouder and Rhodd (2013)	2009–2010	445	Female and age	Architecture, social work, criminal justice, public administration and urban and regional planning	Florida Atlantic University	USA
7	Yang and Raehsler (2005)	2003/2004	169	GPA	Business administration degree majors	Clarion University	USA
8	Opstad and Fallan (2010)	na	295	Female and GPA	Business administration	Trondheim Business School	Norway
9	Raehsler <i>et al.</i> (2012)	1999–2011	1,452	GPA, math and gender	Economics, math and accounting	A rural state university	USA
10	Zwick (2012)*	2003/2004	4,573	High school grade and age	History, Geography, Management, Economics, Social work, Mathematics, Physics, Psychology, Sociology/Political Science, Engineering, Biology/Chemistry, Computer science, Education science, Foreign Languages, German philology and Architecture	German State of Bavaria University	Germany

Note: *Working paper

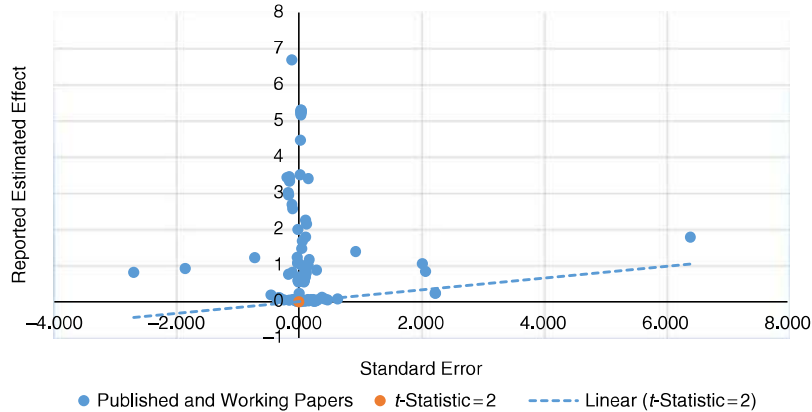


Figure 1. Scatter diagram of reported estimates and standard errors

With few exceptions, most of the points on the scatter graph in Figure 1 lie conspicuously above the line and do not exhibit any cluster tendency around the t -statistic value of 2. As observed from this visual representation, it can be inferred from its symmetric nature that though studies reported both positive and negative values, most are skewed toward negative insignificant estimates. With these results, we conclude that there is no clear evidence of publication bias in our cited literature. However, the scatter plot as a visual representation is subjective and difficult to interpret (Doucouliagos and Paldam, 2009) and might in the absence of none, detect publication bias in some sample of studies. Accurate and reliable statistical tests have, therefore, been designed to confirm or deny the subjective visual impression presented in the scatter graph.

A formal OLS regression-based statistical test has been proposed (Egger *et al.*, 1997) to identify the presence of publication bias:

$$\text{effect}_i = \alpha_i + \beta_i \text{SE}_i + \varepsilon_i, \quad (4)$$

where effect_i is the reported empirical effect from the study and SE_i is its standard error. Equation (4) is akin to the scatter plot presented in Figure 1. The t -test of $H_0: \alpha_i = 0$ from Equation (4) if low power, represents a valid test for detection of publication bias in studies (Egger *et al.*, 1997). Ideally, the regression in Equation (4) is almost never estimated using OLS, as the estimated errors are heteroscedastic. An alternative estimation method which takes this into account by removing the heteroscedasticity is WLS (regression). The WLS is estimated by dividing Equation (4) through by SE_i :

$$t_i = \alpha_i + \beta_i (1/\text{SE}_i) + v_i, \quad (5)$$

where t_i is the t -value of the reported empirical effect (coefficient estimate) and $v_i = (\varepsilon_i/\text{SE}_i)$ is the error term. By estimating the WLS, the disturbances from Equation (5) will be homoscedastic. It is instructive to mention that since β_i has been divided by SE_i the constant and slope coefficient in Equation (5) are reversed of the OLS version in Equation (4). We test an expanded version of the WLS regression in Equation (5) by introducing dummy variables to capture the systematic difference in the actual sign of the reported effects in our sample:

$$t_i = \alpha_i + \beta_{pi} (1/\text{SE}_i) + \beta_{ni} (1/\text{SE}_i) + v_i, \quad (6)$$

where β_{pi} takes the value of 1 if the study reports a positive effect otherwise 0. Conversely, β_{ni} takes the value of 1 if the study reports a negative effect otherwise 0.

Table III shows the regression results of the OLS and WLS version of Equations (4) and (6), respectively.

The OLS regression in Model 1 statistically confirmed the earlier result of the scatter graph that most studies report negative insignificant results. It further suggests that there is no evidence of publication bias in our extant literature ($H_0: \alpha_1 = 0; t = 1.563; p > 0.05$). The WLS regression in Model 2 also shows that since both β_{pi} and β_{ni} are not statistically distinguishable from 0, there is no evidence of publication bias in the extant literature on undergraduate real estate students' academic performance. In addition, it indicates that both negative and positive insignificant results are reported in our cited literature. Interestingly, this finding supports the actual signs of the estimated coefficients in our empirical results in Table V.

4.2 Demographic profile of the real estate students

Table IV provides a summary of characteristics of the students involved in the study sample. As shown in Table IV, out of the 405 students in the sample, 184 (45.40 percent) were female and 221 (54.60 percent) male. In terms of marital status, 11 (2.70 percent) of the students were married before enrolling into the bachelor's program, while 394 (97.30 percent) were single. The average age of these students on enrollment was 21.10 years and they attained an average GPA of 2.84 upon graduation. In the sample, 59.30 percent of the students were from the North-Central geopolitical zone in Nigeria; 0.70 percent from Federal Capital Territory (FCT); 1.20 percent from North-East; 2.70 percent from North-West; 21.50 percent from South-West; 7.20 percent from South-East and 7.40 percent from South-South. In addition, only 1 student eventually had a first class degree, 93 had a second-class upper degree, 202 had a second-class lower degree, 95 had a third class degree while 14 achieved a pass grade. In all, 307 (75.80 percent) of the 405 students eventually became graduates at first attempt, while the remaining graduated at second attempt or more.

4.3 Findings from the stepwise logistic regression on factor affecting students' degree outcome

Table V presents the results of the stepwise logistic regression for the sample of 405 real estate students employed in our estimation. An initial diagnostic check (Hosmer-Lemeshow goodness of fit statistic) was carried out to verify the adequacy of the logistic regression fit and its parsimony. The result of the Hosmer-Lemeshow statistic ($\chi^2 = 12.69, p > 0.123$) was not significant. The non-significance outcome of this initial check implied that the logistic regression model is a good fit and therefore reasonably approximates the behavior of the data sample. The odds ratio for the coefficient of GPA in Table V is positively significant. This coefficient estimate correlates with the academic outcome of students' in terms of their likelihood to graduate at first attempt from the real estate program. For instance, an increase in GPA of a student by 1 basis point increases the student's odds of attaining graduation at first attempt by 3.5 times, all things being equal. It can also be inferred that female students compared to their male peers are 2.5 times more likely to graduate at first attempt. The odds

Table III.
OLS and WLS
regression results
of publication bias

Variable	OLS (Model 1)	WLS (Model 2)
β_1	0.1599 (0.1024)	
α_i	-0.0196 (0.0496)	0.335 (0.092)
β_{pi}		0.016 (0.049)
β_{ni}		-0.017 (0.051)
R^2	0.20	0.003
Number of observation	105	105

Note: SE is reported in parenthesis

Data	Variable type	Mean	SD
GPA	Continuous	2.84	0.74
Age on enrollment	Continuous	21.10	3.25
		Frequency	Percentage (%)
Graduated at first attempt	Binary	307	75.8
Gender	Binary		
Female		184	45.40
Male		221	54.60
Marital status	Binary		
Married		11	2.70
Single		394	97.30
Prior knowledge	Categorical		
Remedial		194	47.90
UTME		128	31.60
Direct entry		83	20.50
Year of entry	Categorical		
Year 2000/2001		47	11.60
Year 2001/2002		113	27.90
Year 2003/2004		91	22.50
Year 2004/2005		85	21.00
Year 2005/2006		69	17.00
High school grade	Binary		
Deficient		210	51.90
Not deficient		195	48.10
Geopolitical background	Categorical		
Federal Capital Territory(FCT)		3	0.70
North-Central		240	59.30
North-East		5	1.20
North-West		11	2.70
South-West		87	21.50
South-East		29	7.20
South-South		30	7.40
Number of observations	405		

Table IV.
Descriptive statistics of the data

Variable	Coefficient	SE	Wald's statistic	Sig. level	Odds ratio
Constant	-9.37	1.57	35.49	0.00	0.00
GPA	1.26*	0.56	5.12	0.02	3.51
Female	0.92*	0.47	3.90	0.05	2.51
UTME	-1.15*	0.53	4.67	0.03	0.32
Direct entry	-0.82	0.66	1.54	0.21	0.44
Year 2001/2002	0.01	0.81	0.00	0.99	1.01
Year 2003/2004	-1.91*	0.84	5.16	0.02	0.15
Year 2004/2005	-2.83*	0.83	11.59	0.00	0.06
Year 2005/2006	-0.43	1.27	0.11	0.74	0.65
Number of sample		405			

Table V.
Stepwise logistic regression model predicting graduation at first attempt

Notes: $\chi^2 = 196.214$; $-2\log\text{likelihood} = 137.690$; $R^2 = 0.473$ (Cox & Snell); 0.713 (Nagelkerke). * $p < 0.05$

for being a female are negative, and aside from the odds of GPA, this variable is the most significant predictor affecting students' performance. This finding lends general credence to previous research that gender is a useful predictor of student academic performance and university graduation rates (Rhodd *et al.*, 2009; Richardson *et al.*, 2012; Schrouder and Rhodd, 2013).

Direct-entry students are 0.44 times less likely than remedial students to finish the bachelor's program at first attempt. Likewise, direct-entry students are also 1.4 times less likely, compared to their UTME peers of potentially being at risk of completing the undergraduate degree program on record time of three or four years. These findings are quite surprising as most direct-entry students are known to be academically superior to both UTME and remedial students. This is against the backdrop that, UTME students are mostly beginners and naïve, with no probable strategy to achieve academic success in the university, while remedial students lack the requisite qualifications for admission into the university, and at least maybe ill-prepared for undergraduate studies. This present finding can be considered within the context of the earlier work of Allen and Carter (2007) that provided evidence that prior knowledge has no effect on the overall academic success of undergraduate real estate students at Florida Atlantic University. This finding is also reflective of the conclusion from prior research (Lee and Mallik, 2015) that neither prior background in mathematics nor HSC mathematics is a useful predictor of students' academic achievement in an online real estate program. While our empirical result reinforced the line of thought of this previous research, our finding, however, differs from those from Newell and Mallik (2011) who reported that prior mathematics background is a significant factor impacting on students' academic performance in property program. This inconsistency in findings may be attributable to the varied methodological approaches employed in prior studies which make a meaningful generalization of findings difficult.

The results also provide evidence of a trend in the students' academic performance based on their year of entry. Students who enrolled in the degree program during the year 2001 were 1.01 times more likely than their counterparts who enrolled during the year 2000 to finish the degree program at first attempt. Similarly, students that enrolled into the program during the year 2003, as well as those enrolled in the year 2004 were both 0.15 times and 0.06 times less likely to complete the degree at first attempt when compared to their year 2000 counterparts. Finally, those enrolled during the year 2005 compared to those of the year 2000 were 0.65 times less likely to graduate at first attempt. These findings imply that students were less likely if enrolled into the undergraduate real estate program in the year 2003, year 2004 and year 2005, but more likely if enrolled in year 2001, to graduate at first attempt than in the year 2000. While this trend might have been induced by inflation and deflation of grades obtained for individual subjects (Rhodd *et al.*, 2009), the potential difference in students' performance in our study may also be attributable to differences in instructional material employed in the teaching process and change in individual subject instructors during the study period. An important implication of this finding is the need to change the existing pedagogical approaches to reflect the best global practices.

Finally, findings also showed that variables such as age, marital status, high school grades and geopolitical or ethnic background of the students were statistically insignificant. As these variables were not significant, it implied that all undergraduate real estate students regardless of their age, marital status, high school grades and their geopolitical background have equal opportunity attaining academic success in the university.

A battery of operational and strategic approaches can be employed in addressing the dimension of factors impacting on the degree outcome of real estate students. These approaches are complementary in nature and can reduce attrition, repetition rates and the inability to graduate in record time among undergraduate real estate students. In an operational context, departmental, school and faculty officers need to monitor important transitions in real estate students' academic progress, so as to identify at-risk students who require help early at the entrant level. Early warning signals on this at-risk real estate students (who are unlikely to graduate at first attempt) are more likely to prevent the risk of curriculum lag (where students perform below expectation) in the future, as they would

have been weed out or withdrawn earlier in the bachelor's program. Furthermore, such information on this category of students can aid universities admission officers in arriving at an informed decision on the best choice of intake during the admission process. Secondly, a change from the conventional to a more effective, pragmatic and innovative teaching and learning strategies is encouraged, even if it comes at an additional cost to the universities. Aside from the traditional face-to-face delivery system, increased emphasis should be placed on the effective use of web-based technologies (blackboards and podcasts), the use of the internet, online educational resources and problem-based learning method. Successful blend of these delivery methods has been found to enhance the quality of teaching and learning in real estate programs, address deficiencies in students' learning and by extension improve universities retention rates (Cornish *et al.*, 2009; Yam and Rossini, 2010, 2012; Newell *et al.*, 2010).

From a strategic viewpoint, some of the existing policy and regulatory framework on tertiary education in Nigeria must be further strengthened. For example, a major finding in our study noted the implication of gender dimension to academic performance among these real estate undergraduate students, and as such, we suggest the need for a policy response from tertiary education administrators to increase graduation rates by engendering gender equality at entry level into the program as enshrined in the National Policy on Education of 2004 – which is to give equal education opportunities to all Nigerians. While the establishment of the Benchmark Minimum Academic Standard to enhance the overall quality and standards of undergraduate program by the regulatory and accrediting body for tertiary education in Nigeria (National Universities Commission) is laudable, greater attention should be given to bridging the competency gap by addressing the key issues of course structure, content and the teaching delivery system to reflect international best practices. The existing pedagogical approaches lack the requisite knowledge, skills and core competencies needed by real estate students which are usually evident during the accreditation visits by regulatory and accrediting agencies as well as by tertiary education instructors during the curriculum development process. A professional accrediting agency such as the Estate Surveyors and Valuers Registration Board of Nigeria can also play a complementary role to the National Universities Commission in terms of bridging this mismatch between core knowledge real estate courses taught in the universities and property industry requirements. This in a way can also lower the likelihood of not graduating at the first attempt and improve the academic performance of undergraduate real estate students in Universities and other tertiary institutions in Nigeria.

5. Conclusion

This paper set out to develop our understanding of the phenomenon of publication bias, and more importantly of the factors affecting the academic performance of real estate students in higher education. From the analysis and discussions contained in this paper, we explored the existence of publication bias in academic articles which hinge on researchers' predisposition in selectively reporting findings which were consistent with some prior beliefs. In this study, we found no evidence of publication bias in the cited literature on undergraduate real estate students' academic performance. The main reflection from this finding is that such reporting in journal publications does not distort the existing literature on students' academic performance nor poses threats to meaningful generalization from relevant empirical studies. Beyond this, the outcome of our logistic regression analysis has shown that GPA, gender differences, prior knowledge and year of entry impact on the possibility of students graduating at first attempt from the undergraduate real estate program. Findings also suggest that regardless of age, marital status, high school grade and geopolitical background, all undergraduate real estate students have equal opportunities of graduating at first attempt from the bachelor's program.

These findings on the academic performance of undergraduate real estate students have both operational and strategic implications. In operational terms, our results suggest the need for university and departmental officers to monitor significant transitions in real estate students' academic progress, so as to identify at-risk students (those unlikely to graduate at first attempt) who require help early at the entrant level. Accurate and reliable gathering of such information can also aid universities admission officers in arriving at an informed decision on the best choice of intake during the admission process. Apart from monitoring the key transitions in real estate students' academic progress, the right mix of the conventional delivery methods with the use of appropriate technologies for teaching and learning must be achieved. This in the end would enhance the quality of teaching and learning and perhaps lift some of the at-risk students out of the "academic trap" and increase their graduation rates in the likely future. From a strategic viewpoint, the need to improve the academic performance of students in the bachelor's degree program, and by extension increase their graduation rates merits consideration from accrediting and regulatory agencies in Nigeria. Accrediting and regulatory agencies in this case must play a complementary role in addressing existing pedagogical approaches which lack the requisite knowledge, skills and core competencies needed by real estate students. Future attention should focus more on course content and structure for real estate discipline in line with international best practice and the need to blend core knowledge with the needs of the property industry. As a recommendation, our study is indicative of a dire need to change the existing pedagogical approaches to reflect the best global practices. Such a paradigm shift in pedagogy can best showcase the Nigerian tertiary institutions offering real estate bachelor's program for a global exposition.

References

- Akinbogun, S.P. (2018), "Admission into real estate undergraduate education in Nigerian Universities: the clog in the wheel", *Property Management*, Vol. 36 No. 3, pp. 358-371.
- Alinaghi, N. and Reed, W.R. (2018), "Meta-analysis and publication bias: 'How well does the FAT-PET-PEESE procedure work?'", *Research Synthesis Methods*, Vol. 9 No. 2, pp. 285-311.
- Allen, M.T. and Carter, C.C. (2007), "Academic success determinants for undergraduate real estate students", *Journal of Real Estate Practice and Education*, Vol. 10 No. 2, pp. 149-160.
- Al-Mutairi, A. (2011), "Factors affecting business students' performance in Arab Open University: the case of Kuwait", *International Journal of Business and Management*, Vol. 6 No. 5, pp. 146-155.
- Aluko, R.O., Adenuga, O.A., Kukoyi, P.O., Soyngbe, A.A. and Oyediji, O.O. (2016), "Predicting the academic performance of architecture students by pre-enrolment requirement: using machine-learning techniques", *Construction Economics and Building*, Vol. 16 No. 4, pp. 86-98.
- Ataguba, J.O., Bioku, J.O. and Ogungbenro, M.T. (2017), "Multi-temporal analysis of regression diagnostics for students' performance in property development and co-requisite courses", *International Journal of Built Environment and Sustainability*, Vol. 4 No. 3, pp. 199-207, doi: 10.11113/ijbes.v4.n3.213.
- Ayan, M.N.R. and Garcia, M.T.C. (2008), "Prediction of university students' academic achievement by linear and logistic models", *The Spanish Journal of Psychology*, Vol. 11 No. 1, pp. 275-288.
- Ayodele, T.O., Oladokun, T.T. and Gbadegesin, J.T. (2016), "Factors influencing academic performance of real estate students in Nigeria", *Property Management*, Vol. 34 No. 5, pp. 396-414.
- Ayodele, T.O., Oladokun, T.T. and Oladokun, S.O. (2017), "Factors influencing real estate students' academic performance in an emerging economy: gender and socioeconomic perspectives", *Property Management*, Vol. 35 No. 5, pp. 472-489, available at: <https://doi.org/10.1108/PM-08-2016-0041>
- Barrie, S.C. (2006), "Understanding what we mean by the generic attributes of graduates", *Higher Education*, Vol. 51 No. 2, pp. 215-241.

- Borenstein, M., Hedges, L.V., Higgins, J.P.T. and Rothstein, H.R. (2009), *Introduction to Meta-Analysis*, Wiley, New York, NY.
- Borg, M.O. and Shapiro, S.L. (1996), "Personality type and student performance in principles of economics", *Journal of Economic Education*, Vol. 27 No. 1, pp. 3-25.
- Brahmasrene, T. and Whitten, G. (2001), "Assessing success on the uniform CPA exam: a logit approach", *Journal of Education for Business*, Vol. 77 No. 1, pp. 45-50.
- Chan, K.C., Shum, C. and Wright, D.J. (1997), "Class attendance and student performance in principles of finance", *Financial Practice and Education*, Vol. 7 No. 2, pp. 58-65.
- Coburn, K.M. and Vevea, J.L. (2015), "Publication bias as a function of study characteristics", *Psychological Methods*, Vol. 20 No. 3, pp. 310-330, available at: <http://dx.doi.org/10.1037/met0000046>
- Cornish, S., Reed, R.K. and Wilkinson, S. (2009), "Incorporating new technology into delivery of property education", *Pacific Rim Property Research Journal*, Vol. 15 No. 3, pp. 303-320.
- Didia, D. and Hasnat, B. (1998), "The determinants of performance in the university introductory finance course", *Financial Practice and Education*, Vol. 8 No. 1, pp. 102-107.
- Donaldson, J.F. and Graham, S.W. (1999), "A model of college outcomes for adults", *Adult Education Quarterly*, Vol. 50 No. 1, pp. 24-40, doi: 10.1177/07417139922086894.
- Doucouliafos, C. and Paldam, M. (2009), "The aid effectiveness literature: the sad results of 40 years of research", *Journal of Economic Surveys*, Vol. 23 No. 3, pp. 433-461.
- Egger, M., Smith, D.G., Schneider, M. and Minder, C. (1997), "Bias in meta-analysis detected by a simple, graphical test", *British Medical Journal*, Vol. 315 No. 7109, pp. 629-634.
- Fielding, A., Charlton, C., Kounali, D. and Leckie, G. (2008), *Degree Attainment, Ethnicity and Gender: Interaction and the Modification of Effects: A Quantitative Analysis*, Equality Challenge Unit, Higher Education Academy, New York, NY.
- Gardy, M.H.S. and Akbay, C. (2015), "Academic performance of undergraduate students at Soran University in Northern Iraq", *International Journal of Advanced Research in Education and Technology*, Vol. 2 No. 4, pp. 92-97.
- Graunke, S.S. and Woosley, S.A. (2005), "An exploration of the factors that affect the academic success of College Sophomores", *College Student Journal*, Vol. 39 No. 2, pp. 367-376.
- Greene, W.H. (2002), *Econometric Analysis*, Prentice Hall, Upper Saddle River, NJ.
- Haynes, S., Richard, D. and Kubany, E. (1995), "Content validity in psychological assessment: a functional approach to concepts and methods", *Psychological Assessment*, Vol. 7 No. 3, pp. 238-247, available at: <http://dx.doi.org/10.1037/1040-3590.7.3.238>
- Hosmer, D.W. and Lemeshow, S.L. (2000), *Applied Logistic Regression*, Wiley-Interscience, New York, NY.
- House, J., Hurst, R. and Keely, E. (1996), "Relationship between learner attitudes, prior achievement and performance in a general education course: a multi-institutional study", *International Journal of Instructional Media*, Vol. 23 No. 3, pp. 257-271.
- Huffman, F. (2011), "Student performance in an undergraduate advanced real estate course: real estate majors vs. finance majors", *Journal of Real Estate Practice and Education*, Vol. 14 No. 2, pp. 111-124.
- Idris, N.R.N. (2012), "A comparison of methods to detect publication bias for meta-analysis of continuous data", *Journal of Applied Science*, Vol. 12 No. 13, pp. 1413-1417, doi: 10.3923/jas.2012.1413.1417.
- Jaeger, A.J. and Hinz, D.M.S. (2008), "The effect of part-time faculty on first semester freshmen retention: a predictive model using logistic regression", *Journal of College Student Retention*, Vol. 10 No. 3, pp. 275-286.
- Kanagi, R., Tan, C.H., Sarimila, K., Lim, K.S., Haslina, K. and Dariush, K. (2015), "Factors affecting first-year undergraduate students' academic performance", *Scholars Journal of Economics, Business and Management*, Vol. 2 No. 1, pp. 54-60.
- Kepes, S., Banks, G.C., McDaniel, M. and Whetzel, D.L. (2012), "Publication bias in the organizational sciences", *Organizational Research Methods*, Vol. 15 No. 4, pp. 624-662, doi: 10.1177/1094428112452760.

- Lee, C.L. and Mallik, G. (2015), "The impact of student characteristics on academic achievement: findings from an online undergraduate property program", *Pacific Rim Property Research Journal*, Vol. 21 No. 1, pp. 3-14.
- Light, R.J., Singer, J.D. and Willet, J.B. (1994), "The visual presentation and interpretation of meta-analyses", in Cooper, H.M. and Hedges, L.V. (Eds), *The Handbook of Research Synthesis*, Russell sage foundation, New York, NY, pp. 439-453.
- Lipsey, M.W. and Wilson, D. (2001), *Practical Meta-analysis*, Sage Publications, London.
- McKenzie, K. and Schweitzer, R. (2001), "Who succeeds at University? factors predicting academic performance in first year Australian university students", *Higher Education Research and Development*, Vol. 20 No. 1, pp. 21-33.
- Mallik, G. and Shankar, S. (2016), "Does prior knowledge of economics and higher-level mathematics improve student learning in principles of economics?", *Economic Analysis and Policy*, Vol. 49 No. 2016, pp. 66-73.
- Manning, C. and Eply, D. (2006), "Do real estate faculty teach the skills and competencies needed by corporate real estate executives?", *Journal of Real Estate Practice and Education*, Vol. 9 No. 1, pp. 37-60.
- Moreno, S.G., Sutton, A.J., Turner, E.H., Abrams, K.R., Cooper, N.J., Palmer, T.M. and Ades, A.E. (2009), "Novel methods to deal with publication biases: secondary analysis of antidepressant trials in the FDA trial registry database and related journal publications", *British Medical Journal*, Vol. 2009 No. 339, pp. 1-7, doi: 10.1136/bmj.b2981.
- Newell, G. and Mallik, G. (2011), "The importance of mathematics background and student performance in a property degree", *Pacific Rim Property Research Journal*, Vol. 17 No. 2, pp. 313-328.
- Newell, G., Susilawati, C. and Yam, S. (2010), "Student perceptions of the quality of property education in Australia: 1994-2009", *Pacific Rim Property Research Journal*, Vol. 16 No. 4, pp. 400-422.
- Nonis, S. and Wright, D. (2003), "Moderating effects of achievement striving and situational optimism on the relationship between ability and performance outcomes of college students", *Research in Higher Education*, Vol. 44 No. 3, pp. 327-346.
- Nyikahadzo, L., Matamande, W., Taderera, E. and Mandimika, E. (2013), "Determinants of students' academic performance in four selected accounting courses at University of Zimbabwe", *Research in Higher Education Journal*, Vol. 21 No. 1, pp. 1-9.
- Olatunji, S.O., Aghimien, D.O., Emmanuel, A. and Olushola, O.E. (2016), "Factors affecting performance of undergraduate students in construction related disciplines", *Journal of Education and Practice*, Vol. 17 No. 3, pp. 55-62.
- Oloyede, S.A. and Adegoke, O.J. (2007), "Relevance of real estate education to practice in Nigeria", *Journal of Land Use and Development Studies*, Vol. 3 No. 1, pp. 50-59.
- Opstad, L. and Fallan, L. (2010), "Student performance in principles of macroeconomics: the importance of gender and personality type", *International Review of Economics Education*, Vol. 9 No. 1, pp. 76-92.
- Peng, C.Y.J. and So, T.S.H. (2002a), "Modelling strategies in logistic regression", *Journal of Modern Applied Statistical Methods*, Vol. 1 No. 1, pp. 147-156.
- Peng, C.Y.J. and So, T.S.H. (2002b), "Logistic regression analysis and reporting: a primer", *Understanding Statistics*, Vol. 1 No. 1, pp. 31-70.
- Peng, C.Y.J., Lee, K.L. and Ingersoll, G.M. (2002), "An introduction to logistic regression analysis and reporting", Vol. 96 No. 1, pp. 3-14, available at: <https://doi.org/10.1080/00220670209598786>
- Peng, C.Y.J., So, T., Stage, F. and St John, E. (2002), "The use and interpretation of logistic regression in higher education journals: 1988-1999", *Research in Higher Education*, Vol. 43 No. 3, pp. 259-293.
- Peter, N.J., Ayedun, C., Oloyede, S., Oluwunmi, A.O., Oluwatobi, A. and Emeghe, I.J. (2016), "Gender perspective in students' performance in real estate education: the case of Covenant University Students, Ota, Nigeria", *9th Annual International Conference of Education, Research and Innovation, Spain, November 1-16*, pp. 7539-7545, doi: 10.21125/iceri.2016.

- Polit, D.F. and Beck, C.T. (2006), "The content validity index: are you sure you know what's being reported? critique and recommendations", *Research in Nursing and Health*, Vol. 29 No. 5, pp. 489-497, doi: 10.1002/nur.20147.
- Poon, J. and Brownlow, M. (2014), "Competency expectations for property professionals in Australia", *Journal of Property Investment and Finance*, Vol. 32 No. 3, pp. 256-281.
- Poon, J., Hoxley, M. and Fuchs, W. (2011), "Real estate education: an investigation of multiple stakeholders", *Property Management*, Vol. 29 No. 5, pp. 468-487.
- Raehsler, R.D., Hung, K., Yang, C.W. and Stuhldreher, T.J. (2012), "Are mathematics, economics, and accounting courses important determinants in financial management: a rank order approach", *Journal of Economics and Finance Education*, Vol. 11 No. 1, pp. 48-59.
- Rhodd, R.G., Schrouder, S.M. and Allen, M.T. (2009), "Does the performance on principles of economics courses affect the overall academic success of undergraduate business majors?", *International Review of Economics Education*, Vol. 8 No. 1, pp. 48-63.
- Richardson, J.T.E. (2008), Degree attainment, ethnicity and gender: a literature review, Higher Education Academy, The Open University, Institute of Educational Technology, Milton Keynes.
- Richardson, M., Abraham, C. and Bond, R. (2012), "Psychological correlates of university students' academic performance: a systematic review and meta-analysis", *Psychology Bulletin*, Vol. 138 No. 2, pp. 353-387.
- Rubio, D., Berg, W.M., Tebb, S., Lee, E. and Rauch, S. (2003), "Objectifying content validity: conducting a content validity study in social work research", *Social Work Research*, Vol. 27 No. 2, pp. 94-104.
- Salamonson, Y., Weaver, R., Chang, S., Koch, J., Bhathal, R., Khoo, C. and Wilson, I. (2013), "Learning approaches as predictors of academic performance in first year health and science students", *Nurse Education Today*, Vol. 33 No. 7, pp. 729-733, doi: 10.1016/j.nedt.2013.01.013.
- Saw, S.M. and Ng, T.P. (2001), "The design and assessment of questionnaires in clinical research", *Singapore Medical Journal*, Vol. 42 No. 3, pp. 131-135.
- Schrouder, S.M. and Rhodd, R.G. (2013), "Non-intellectual variables as factors in determining academic success: are older students likely to be more successful?", *International Journal of Education and Research*, Vol. 1 No. 6, pp. 1-12.
- Shrotryia, V.K. and Dhanda, U. (2019), "Content validity of assessment instrument for employee engagement", *SAGE Open*, Vol. 9 No. 1, pp. 1-7, doi: 10.1177/2158244018821751.
- Stanley, T.D. (2008), "Meta-regression methods for detecting and estimating empirical effect in the presence of publication selection", *Oxford Bulletin of Economics and Statistics*, Vol. 70 No. 1, pp. 103-127.
- Stanley, T.D. (2017), "Limitation of PET-PEESE and other meta-analysis methods", *Social Psychological and Personality Science*, Vol. 8 No. 5, pp. 581-591, doi: 10.1177/1948550617693062.
- Stanley, T.D. and Doucouliagos, H. (2014), "Meta-regression approximations to reduce publication bias", *Research Synthesis Method*, Vol. 5 No. 1, pp. 60-78, available at: <https://doi.org/10.1002/jrsm.1095>
- Sterne, J.A.A., Gavaghan, D. and Egger, M. (2000), "Publication and related bias in meta analysis: power of statistical tests and prevalence in literature", *Journal of Clinical Epidemiology*, Vol. 53 No. 11, pp. 1119-1129.
- Tabachnick, B.G. and Fidell, L.S. (2001), *Using Multivariate Statistics*, Harper Collins, New York, NY.
- Tabachnick, B.G. and Fidell, L.S. (2007), *Using Multivariate Statistics*, Pearson Education, Boston, MA.
- Tu, C., Weinstein, M., Worzala, E. and Lukens, L. (2009), "Elements of successful graduate real estate programs: perceptions of the stakeholders", *Journal of Real Estate Practice and Education*, Vol. 12 No. 2, pp. 105-121.
- vanAert, R.C.M., Wicherts, J.M. and vanAssen, M.A.L.M. (2019), "Publication bias examined in meta analyses from psychology and medicine: a meta-meta-analysis", *PLoS One*, Vol. 14 No. 4, p. e0215052, available at: <https://doi.org/10.1371/journal.pone.0215052>

- Vars, F.E. and Bowen, W.G. (1998), "Scholastic aptitude test scores, race and academic performance in selective colleges and universities", in Christopher, J. and Meredith, P. (Eds), *The Black-White Test Score Gap*, The Brookings Institution Press, Washington, DC, pp. 457-479.
- Win, R. and Miller, P. (2005), "The effects of individual and school factors on university students' academic performance", *Australian Economic Review*, Vol. 38 No. 1, pp. 1-18.
- Wynd, C.A., Schmidt, B. and Schaefer, M.A. (2003), "Two quantitative approaches for estimating content validity", *Western Journal of Nursing Research*, Vol. 25 No. 5, pp. 508-518.
- Yam, S. and Rossini, P. (2010), "Effectiveness of project-based learning as a strategy for property education", *Pacific Rim Property Research Journal*, Vol. 16 No. 3, pp. 291-313.
- Yam, S. and Rossini, P. (2012), "Online learning and blended learning: experience from a first-year undergraduate property valuation course", *Pacific Rim Property Research Journal*, Vol. 18 No. 2, pp. 129-148.
- Yang, C.W. and Raehsler, R.D. (2005), "An economic analysis on intermediate microeconomics: an ordered probit model", *Journal of Economics Educators*, Vol. 5 No. 3, pp. 1-11.
- Zamanzadeh, V., Ghahramanian, A., Rassouli, M., Abbaszadeh, A., Alavi-Majd, H. and Nikanfar, A.R. (2015), "Design and implementation content validity study: development of an instrument for measuring patient-centered communication", *Journal of Caring Sciences*, Vol. 4 No. 5, pp. 165-178.
- Zeegers, P. (2004), "Student learning in higher education: a path analysis of academic achievement in science", *Higher Education Research and Development*, Vol. 23 No. 1, pp. 35-56.
- Ziegert, A.J. (2000), "The role of personality temperament and student learning in principles of economics: further evidence", *Journal of Economic Education*, Vol. 31 No. 4, pp. 307-322.
- Zwick, T. (2012), "Determinants of individual academic achievement: group selectivity effects have many dimensions", discussion paper 12-081, ZEW-Leibniz Centre of European Economics Research, Mannheim.

About the authors

Ismail Ojetunde, MSc, is Lecturer at the Department of Estate Management and Valuation, Federal University of Technology Minna in Nigeria. His research interests span real estate market outcomes, urban real estate economics and real estate education. Ismail Ojetunde is the corresponding author and can be contacted at: i.ojetunde@futminna.edu.ng

Abass Iyanda Sule, PhD, is Lecturer at the Department of Estate Management and Valuation, Federal University of Technology Minna in Nigeria. His research interests focus on public housing and livability outcomes.

Olorotimi Adebowale Kemiki, PhD, is Associate Professor of Estate Management and Valuation, Federal University of Technology Minna in Nigeria. He is interested in land information systems and urban real estate economics. He has published in highly reputable journals and presented papers at both local and international fora.

Isaac Ayodele Olatunji, PhD, is Associate Professor of Estate Management and Valuation, Federal University of Technology Minna in Nigeria. His research interests focus on housing optimality, applied valuation and real estate market.