Pre-college preparedness and institutional factors for student success on the uniform CPA examination in Texas

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Abstract: This study examines determinants of accounting students’ successful bid for the uniform Certified Public Accountant (CPA) examination in Texas. With a sample of data from 30 public universities in Texas from 2005 to 2007, our analysis suggests that academic deficiency of incoming first-year students explains 49% of the institutional variation in the CPA exam pass rate. In contrast, educational quality (as measured by faculty salary, AACSB accreditation in accounting and accounting programme size) provides a less pronounced contribution to success in the CPA examination (13% of the institutional variation). Thus, the institution-level variation in the CPA exam pass rate among public universities in Texas seems to be predetermined to a great extent by the pre-college preparation of the students they admit.

Keywords: CPA examination pass rate; academic deficiency; educational quality; admission standards; remedial services.


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Rahim Quazi is an Associate Professor of Economics at Prairie View A&M University. He earned a PhD in Economics from the University of Illinois, Urbana-Champaign. He has published many refereed articles on business education and applied economic issues, including foreign aid, foreign investment, capital flight and water planning.
1 Introduction

The purpose of this study is to examine the effect of pre-college preparedness and institutional factors on accounting students’ success in the uniform Certified Public Accountant examination (CPA exam) in Texas. The Texas State Board of Public Accountancy (TSBPA) disseminates results of the CPA exam, summarised by college in Texas, every quarter. This is done in response to Executive Order RP 31 of 22 January 2004, in which Governor Perry emphasised the accountability of state-funded colleges. One of the key criteria for accountability is to assess whether an institution has provided high quality education and achieved its educational goals based on a variety of performance measures. For example, success measures include graduation rates, persistence rate, degrees awarded, teacher production and certification, the academic progress of underprepared students towards their degree programme and others. In general, most of these measures are based on data internally collected by a reporting institution. However, in academic disciplines for which external certification or licence exams are required, such as law, nursing, pharmacy, engineering and education, universities also include their students’ professional-exam pass rate as a success measure.

The CPA is the only professional licensure routinely sought by business college graduates. A CPA licence is required for accountants only if they issue attestation opinions on financial statements. Thus, accounting graduates interested in working for a corporation or the government are not generally eager to sit for the CPA exam. The requirement of the CPA licensure for only a limited portion of all accounting professionals contrasts with fields such as law or health in which licensure is mandatory for any person providing professional services. Because of the self-selective nature of the CPA licence, universities do not provide statistics on the success of their students in the CPA exam under Executive Order RP 31. Nonetheless, results of the CPA exam published by the TSBPA allow insight into the effectiveness of institutions’ accounting programmes.

It should be noted that measuring the effectiveness of accounting programmes solely by their ranking based on the results of the CPA examination would be, at best, a partial truth for the following reasons. First, the accounting curriculum at institutions of higher education is not geared towards preparing students for the CPA examination. Instead, it focuses on providing a general accounting education in a liberal arts setting and preparing graduates for a variety of careers. Those who plan to work for accounting firms usually enrol in private CPA examination review courses, which cost in the neighbourhood of $2500, prior to taking the CPA exam. Accounting students are well aware that a successful bid for the CPA exam entails extraordinary efforts and commitments as demonstrated by historic success rates, e.g. approximate 10% of first-time candidates pass all four parts of the exam (Vucinic, 2008). This daunting fact may deter a significant portion of accounting graduates from attempting this challenging task based on their subjective feeling that ‘this examination is not for me’.
Second, many state universities in Texas have open-admission policies intended to provide the opportunity for a college education to students from less privileged groups. Thus, admission standards are developed to accommodate applicants’ aspirations, not to recruit only those with potential to pass the CPA examination. As a result, success rates on the CPA exam in Texas will not uniformly represent value-added efforts and commitment that accounting faculty contribute towards students’ efforts to gain employable skills and knowledge in accounting. Institutions that selectively admit students are more likely to have better results from their graduates than institutions that admit students without significant regard to pre-college educational accomplishment. This should not be a surprise, but expected. Accordingly, success at the CPA exam depends on factors generally beyond the control of the accounting educators. The contribution of accounting educators should be measured by the value added to the actual pre-existing knowledge base of their graduates rather than by some yardstick that effectively assumes that all students have a uniform pre-existing knowledge base.

Third, institutional resources available for supra-curricular activities, such as tutoring for the CPA exam, play a positive role in preparing students for the CPA exam. Resource-rich private and public institutions can provide more of such services to their students, thereby enhancing the success rate of those students in the CPA examination.

In this study, we identify several institutional variables that may contribute to accounting students’ success in the CPA exam, e.g. the academic preparedness of incoming students in basic academic areas such as reading, writing and math, the percentage of top quality students admitted and the attributes of a university such as faculty salaries, number of accounting faculty and a possession of the Association to Advance Collegiate Schools of Business (AACSB) International’s accreditation in accounting. A volume of research documents the determinants of academic success of college students, primarily focusing on basic cognitive skills (Kenny et al., 1979; Murnane et al., 1995; Adelman, 1999; Trusty and Niles, 2003; Tai et al., 2006). However, to the best of our knowledge, not much research has been done with respect to students’ success in the CPA exam even though publicised results of the CPA exam have quietly served as a proxy for educational quality in accounting at a higher educational institution. Thus, this study is intended to shed some light on this neglected area of education research.

Our results show that the math deficiency rate of incoming students is a primary determinant of the variation in the CPA exam pass rate among 30 public universities in Texas. Further, the combination of academic preparedness proxies for incoming students in all three areas (reading, writing and math) explains almost 50% of variation in the CPA examination pass rate. When three proxies for educational quality are added, the variation in the CPA exam pass rate among public universities in Texas is explained up to 62%.

Based on the results, we conclude that the CPA exam pass rate of students from any particular public university in Texas is predetermined to a great extent by the academic readiness of newly admitted students, in particular, in mathematics. Accordingly, ranking colleges based on results of the CPA exam reflects the type of students a public university admits, not the quality of faculty contribution to the enhancement of student learning.

The contributions of this study are twofold, in particular for an institution in which student success at the uniform CPA examination is considered as one of its major educational goals. This study suggests the need of (a) developing optimal admission standards and (b) implementing effective remedial services for newly admitted students who lack college preparedness.
The remainder of the paper is organised as follows. Section 2 reviews relevant literature and proposes a research question. Section 3 describes the data collection process and the research methodology. Section 4 provides empirical results, and Section 5 concludes the paper.

2 Literature review and research questions

On 22 January 2004, Texas Governor Rick Perry issued Executive Order RP 31 which requires that the Texas Higher Education Coordinating Board (THECB) and each public institution of higher education provide ‘the information necessary to determine the effectiveness and quality of the education students receive…to evaluate the institutions’ use of state resources’. In response, in 2004, the THECB launched the Texas Accountability System to, inter alia, provide data for Texas public higher education institutions in three major areas: (a) key accountability measures, (b) contextual/explanatory measures and (c) institutional explanation and description. The information can be found at the website (THECB, 2008).

The principal motivating purpose of the Texas Accountability System is to measure the incremental contribution state-funded colleges make towards the enhancement of students’ learning. Higher education institutions accept students and assist them in acquiring the academic and practical knowledge and skills demanded by industry or graduate schools. However, higher education necessarily builds on the academic foundation students acquired during elementary and secondary education. Accordingly, the level of student learning upon graduation from higher education institutions is a function of (a) what students learned before matriculation and (b) what students learn at the college level.

A number of studies have examined the importance of basic cognitive skills in successfully completing college education (Kenny et al., 1979; Murnane et al., 1995; Adelman, 1999; Trusty and Niles, 2003; Tai et al., 2006). Kenny et al. (1979) chose 4469 observations from the approximately 40,000 12th grade males included in the Project TALENT database, which includes a sample of all students from grades 9 to 12 in 1960. They reported students’ pre-college mathematical achievement as a positive indicator of success in college education. Murnane et al. (1995) examined two large longitudinal databases reporting the labour market performance of high school students: (a) the National Longitudinal Study of the High School Class of 1972 (NLSHS) which includes labour market information about 22,652 students and (b) High School and Beyond (HSB) which contains labour market information about 11,500 students in 1980s. Students in both databases took tests in mathematics, reading and vocabulary skills during their last year in high school. Murnane et al. confirm the findings of Kenny et al. by reporting test scores in mathematics as a predictor of attaining college education. Adelman (1999), Trusty and Niles (2003) and Tai et al (2006) reported consistent results. Thus, the learning outcome of higher educational institutions significantly depends upon the pre-college attainment of entering students, particularly when the institutions adopt an open-door admission policy to extend higher education to underprivileged students. Based on the preceding factors, we developed a research hypothesis in alternative form as follows:
Hypothesis: The result on the CPA exam achieved by graduates of Texas public universities and colleges is significantly predetermined by the level of incoming students’ academic preparedness for college education.

3 Data and methodology

Data for the study were primarily collected from two Texas organisations, the TSBPA and the THECB. The TSBPA publishes the results of the CPA exam for Texas higher education institutions every quarter. The information includes: (a) the number of candidates, (b) total sections tested, (c) total sections passed and (d) percentage of sections passed. We cumulated data for three years (2005–2007) and divided total sections passed by total sections taken to compute a CPA pass rate (CPAPass) for each public university in Texas (TSBPA, 2008).

The Texas Accountability System website of the THECB includes institutional data of Texas state-run universities in five areas: (a) participation, (b) success, (c) excellence, (d) research and (e) institutional effectiveness and efficiencies (THECB, 2008). The website includes several measurements that could describe the student body and educational quality at a public university, including the number of First-Time-In-College (FTIC) students who met state standards in all areas (mathematics, reading and writing), the number of students who did not meet state standards in the three areas, average faculty salary by rank, the demographic information of the student body and others. The information about the academic readiness is not segregated by major, therefore overall institutional statistics are used as proxies for those of the accounting students based on an assumption that the pre-college preparedness of accounting students as compared to the institution-wide student body is stable across institutions. There is no objective evidence that suggests the proportion of better or lesser prepared students gravitating to accounting differs significantly from one institution to the next.

We compute academic readiness ratios of students per institution using four variables:

1. the percentage of students who did not meet state standards in the mathematics area (Below_M),
2. the percentage of students who did not meet state standards in the reading area (Below_R),
3. the percentage of students who did not meet state standards in all three areas, mathematics, reading and writing (Fail_All) and
4. the percentage of top 10% of the graduating class admitted in an institution’s freshmen class (Top10).

The most-recent data on the success on these state mandated tests published by the THECB are available for the Fall 2003 entering cohort. In Texas, students in the top 10% of their graduating high school have automatic admission to any public university in the state. Thus, the four variables are adopted to measure the academic preparedness of incoming students at a public university in Texas.

Educational quality at an institution represents an incremental amount of knowledge students have acquired during their degree programmes. The best method to measure educational quality could be to assess differences in students’ stocks of academic
knowledge at two points of time: matriculation and graduation. In the absence of such entry and exit tests, we chose three proxy variables: faculty salary, AACSB International accreditation in accounting (AACSB_AC) and the number of accounting faculty members.

Faculty salary is chosen as more qualified faculty members should be rewarded more in a competitive job market (Solomon, 1975). The average salary of assistant professors at each institution in the sample is used to measure faculty salary. Since assistant professors have been hired in the recent past, their average salary is presumed to represent an institution’s competitiveness in recruiting high quality new faculty. ‘LSalary’ is denoted for the natural log value of faculty salary.

AACSB International states that its goal is ‘to advance quality management education worldwide through accreditation and thought leadership’ (AACSB International, 2010). As of January 2010, 579 colleges and universities around the world are accredited for their business programmes. Only 170 colleges and universities in the world hold additional accreditation in accounting beyond their accreditation in business. Thus, AACSB specialised accreditation in accounting indicates an institution’s commitment to delivering quality education in accounting (Haugen et al., 2004). Nine universities in the sample hold AACSB accreditation in accounting. Finally, the number of accounting faculty at an institution is obtained from the Accounting Faculty Directory 2006–2007 (Hasselback, 2006). In general, allocated resources are positively related to programme size; thus the bigger the accounting programme, the better the educational quality. ‘LAfaculty’ is denoted for the natural log value of accounting faculty size.

We started with an initial sample of 35 public universities in Texas because the Higher Education Accountability system of the THECB includes only state-funded universities. Five universities were excluded because complete data are not available from the TSBPA and THECB databases. The THECB report does not include data on incoming undergraduate students for Texas A&M, Texarkana; University of Houston, Clear Lake and University of Houston, Victoria. The TSBPA does not report the results of the CPA exam for Texas A&M, Galveston and Sul Ross State University, Rio Grande College. As a result, the final sample includes 30 public universities in Texas.

We adopted the forward selection method of stepwise regression in the absence of a guiding theory about what variables should be included to explain the behaviour of the dependent variable, i.e. the pass rate of the CPA examination at an institution (Mendenhall and Sincich, 1986). We assess statistical significance about an incremental improvement in the regression model’s adjusted $R^2$ by including additional variables. A basic empirical regression model is developed using each of the three proxies for the academic preparedness of incoming students at a public university:

$$\text{CPAPass}_i = \alpha_0 + \alpha_1 \text{QStudent}_i + \mu_i$$

where

\( \text{CPAPass}_i \) = passing rate of the CPA exam for a public university \( i \) in Texas from 2005 to 2007.

\( \text{QStudent}_i \) = quality of students that were admitted to a public university \( i \) in Texas.

\( \text{QStudent} \) is proxied by each of Below_M, Below_R and Fail_All for students in the Fall 2003 cohort.
Below_R<sub>i</sub> = deficiency ratio in reading is computed by dividing the number of FTIC students who did not meet state standards in reading by the number of FTIC students per university <i>i</i> in the Fall 2003 cohort.

Fail_All<sub>i</sub> = deficiency ratio in all three areas (reading, writing and mathematics) is computed by dividing the number of FTIC students who did not meet state standards in any area by the number of FTIC students per university <i>i</i> in the Fall 2003 cohort.

Below_M<sub>i</sub> = deficiency ratio in mathematics is computed by dividing the number of FTIC students who did not meet state standards in mathematics by the number of FTIC students per university <i>i</i> in the Fall 2003 cohort.

<i>a</i><sub>0,1</sub> = parameters for a public university <i>i</i>.

<i>μ</i><sub>i</sub> = disturbance term.

Equation (1) is extended by including all four proxies for incoming students' academic preparedness in equation (2):

\[
CPAPass = \alpha_0 + \alpha_1 Below_R + \alpha_2 Fail_All + \alpha_3 Below_M + \alpha_4 Top10 + \mu
\]  

where

Top10<sub>i</sub> = ratio of FTIC students who were top 10% in their high school class in Fall 2006 at a university <i>i</i>.

All other variables are as defined above.

The contribution made by a university lies in the amount of value-added to the knowledge base of its entering students. Thus, we add the proxies for the educational quality of accounting program at an institution: LSalary, LAfaculty and AACSB_AC in equation (3):

\[
CPAPass = \alpha_0 + \alpha_1 Below_R + \alpha_2 Fail_All + \alpha_3 Below_M + \alpha_4 Top10 + \alpha_5 LSalary + \alpha_6 LAfaculty + \alpha_7 AACSB_AC + \mu
\]

where

LSalary<sub>i</sub> = the natural log value of an annualised mean salary of assistant professors per university <i>i</i> over three years from 2005 to 2007.

LAfaculty<sub>i</sub> = the natural log value of annualised average accounting faculty size per university <i>i</i> over three years from 2005 to 2007.

AACSB_AC<sub>i</sub> = a unit value assigned to a university with a membership in the AACSB International accreditation in accounting; zero is assigned to universities without that accreditation.

4 Empirical results

Table 1 includes descriptive statistics of CPAPass and college readiness variables. CPAPass ranges from 12.7% to 69.5% with 40.1% as a mean, which is lower than the national average of about 53% from 2004 to 2006 (Mills, 2007). The difference might
result from how a mean is computed: by institution vs. by individual candidate. For example, a mean by individual candidate is 51.4% in Table 3. The percentage of Fall 2003 students who did not meet state standards in mathematics (Below_M) ranges from .4% to 59% with a mean of 20.4%; similar results are observed for students who failed in reading (Below_R) with a mean of 15.1%. A wide range is observed for Top10 – from 0 to 64.6% with a mean of 15.9%. The largest undergraduate programme in accounting in the sample has 35 full-time instructors while the smallest undergraduate programme in accounting has two full-time instructors. An average salary of assistant professors varies from $43,559 to $83,019 among institutions.

Table 1  Descriptive statistics

<table>
<thead>
<tr>
<th>Variable</th>
<th>Minimum</th>
<th>Mean</th>
<th>Median</th>
<th>Maximum</th>
<th>Standard deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>CPAPass</td>
<td>.127</td>
<td>.401</td>
<td>.402</td>
<td>.695</td>
<td>.132</td>
</tr>
<tr>
<td>Below_M</td>
<td>.004</td>
<td>.204</td>
<td>.204</td>
<td>.590</td>
<td>.168</td>
</tr>
<tr>
<td>Below_R</td>
<td>.037</td>
<td>.151</td>
<td>.132</td>
<td>.472</td>
<td>.136</td>
</tr>
<tr>
<td>Fail_All</td>
<td>0</td>
<td>.052</td>
<td>.029</td>
<td>.257</td>
<td>.067</td>
</tr>
<tr>
<td>Top10</td>
<td>0</td>
<td>.159</td>
<td>.132</td>
<td>.646</td>
<td>.130</td>
</tr>
<tr>
<td>AFaculty</td>
<td>2</td>
<td>11</td>
<td>9</td>
<td>35</td>
<td>8.97</td>
</tr>
<tr>
<td>SALARY</td>
<td>43,559</td>
<td>57,016</td>
<td>54,119</td>
<td>83,019</td>
<td>7949</td>
</tr>
</tbody>
</table>

Notes: We selected 30 sample public universities for which required variables are available from databases at the Texas State Board of Public Accountancy (TSBPA) and Texas Higher Education Coordinating Board (THECB). The TSBPA displays the results of the uniform Certified Public Accounting (CPA) examination from April 2004 by college in Texas. The results are summarised quarterly (January/February, April/May, July/August and October/November). The THECB maintains the higher education accountability system to evaluate the educational performance of all public universities in Texas in six fields: participation, success, excellence, research, institutional efficiency and effectiveness, and patient care.


Below_M: deficiency ratio in mathematics is computed by dividing the number of First-Time-In-College (FTIC) students who did not meet state standards in mathematics by the number of FTIC students per university $i$ in the Fall 2003 cohort.

Below_R: deficiency ratio in reading is computed by dividing the number of FTIC students who did not meet state standards in reading by the number of FTIC students per university $i$ in the Fall 2003 cohort.

Fail_All: deficiency ratio in all three areas (reading, writing and mathematics) is computed by dividing the number of FTIC students who did not meet state standards in any area by the number of FTIC students per university $i$ in the Fall 2003 cohort.

Top10: ratio of FTIC students who were top 10% in their high school class in Fall 2006 at university $i$.

AFaculty: average number of annualised accounting faculty members over three years from 2005 to 2007 academic year at university $i$.

SALARY: average annualised salary for assistant professors at university $i$ over three years from 2005 to 2007.
Table 2 shows pair-wise Pearson correlations between the variables concerned. CPAPass shows the highest correlation with Below_M (−0.65), which is statistically significant at the .01 level. Also, Top10 appears to be another important indicator of success in the CPA exam by showing a 0.55 correlation with CPAPass. All other variables demonstrate expected positive signs of correlation with CPAPass. As expected, high correlations (higher than 0.90) exist among Below_M, Below_R and Fail_All. AACSB_AC and LAfaculty show positive high correlations with CPAPass, 0.584 and 0.459, respectively, with statistical significance at the .01 level. Thus, both variables representing educational quality appear to be relevant determinants of CPAPass.

We also explored three additional explanatory variables: Scholastic Aptitude Test (SAT) scores of incoming students, number of students per faculty member and ratio of accounting faculty members with a terminal degree in the undergraduate programme in accounting. CPAPass is not significantly correlated with either the number of students per faculty or the ratio of accounting faculty members with a terminal degree. SAT scores were available for only 27 of the 30 universities in the sample. SAT scores were found to be significantly correlated with CPAPass with correlation of 0.644, which is significant at the .01 level (untabulated). Further, the correlation between mean SAT scores and Below_M is −0.81, which is statistically significant at the .01 level. When both Below_M and SAT scores are included in the testing models, we found a marginal incremental contribution beyond Below_M in explaining CPAPass while losing three observations. Accordingly, the three variables are not included in our analysis.

Table 2

<table>
<thead>
<tr>
<th></th>
<th>CPAPass</th>
<th>Below_M</th>
<th>Below_R</th>
<th>Fail_All</th>
<th>Top10</th>
<th>LSalary</th>
<th>LAFaculty</th>
</tr>
</thead>
<tbody>
<tr>
<td>Below_M</td>
<td>−.650</td>
<td>(0.00)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Below_R</td>
<td>−.569</td>
<td>.941</td>
<td>(0.001)</td>
<td>(0.00)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fail_All</td>
<td>−.608</td>
<td>.909</td>
<td>.916</td>
<td>(0.00)</td>
<td>(0.00)</td>
<td>(0.00)</td>
<td></td>
</tr>
<tr>
<td>Top10</td>
<td>.552</td>
<td>−.524</td>
<td>−.559</td>
<td>−.413</td>
<td>(0.001)</td>
<td>(0.002)</td>
<td>(0.001)</td>
</tr>
<tr>
<td>LSalary</td>
<td>.314</td>
<td>−.449</td>
<td>−.436</td>
<td>−.264</td>
<td>.664</td>
<td>(0.011)</td>
<td>(0.017)</td>
</tr>
<tr>
<td>LAFaculty</td>
<td>.459</td>
<td>−.504</td>
<td>−.439</td>
<td>−.316</td>
<td>.569</td>
<td>.766</td>
<td>(0.099)</td>
</tr>
<tr>
<td>AACSB_AC</td>
<td>.584</td>
<td>−.527</td>
<td>−.497</td>
<td>−.361</td>
<td>.583</td>
<td>.756</td>
<td>.784</td>
</tr>
</tbody>
</table>

Notes: LSalary – the natural log value of mean annualised salary of assistant professors per university i over three years from 2005 to 2007.
LAFaculty – the natural log value of annualised accounting faculty size per university i over three years from 2005 to 2007.
AACSB_AC – a unit value is assigned to a university with a membership in the Association to Advance Collegiate Schools of Business (AACSB) International accreditation in accounting; zero is assigned to universities without that accreditation.
All other variables are as defined in Table 1.
Table 3 shows CPAPass in quintiles of the sample. The sample is sorted in ascending order based on their respective Below_M score and then partitioned in quintiles with six universities per quintile. Within each quintile, the number of sections passed is divided by the number of sections taken by students from the six universities. From 2005 to 2007, candidates from 30 public universities in the sample took 22,085 sections of the CPA exam and passed 11,356 sections, producing an average pass rate of 51.4%. The average CPAPass rate is 48.8% for candidates from top 12 universities but only 34.5% for candidates from the bottom 12 universities. The difference, 14.3%, is statistically significant at the .01 level and indicates that CPAPass of a university is significantly influenced by the academic preparedness of its incoming students.

<table>
<thead>
<tr>
<th>Quintile</th>
<th>Sections passed</th>
<th>Sections taken</th>
<th>Pass rate (A)</th>
<th>Pass rate (B)</th>
<th>Diff</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>7,147</td>
<td>11,684</td>
<td>61.2%</td>
<td>48.8%</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>2,830</td>
<td>6,440</td>
<td>43.9%</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
| 3        | 504            | 1,370          | 36.8%         | 34.5%         | 14.3 (2.88***)
| 4        | 433            | 1,143          | 37.9%         |               |      |
| 5        | 442            | 1,448          | 30.5%         |               |      |
| Total    | 11,356         | 22,085         | 51.4%         |               |      |

Notes: The sample 30 universities are sorted in ascending order by Below_M and then partitioned into quintiles. Within each quintile, the number of sections in the CPA examination passed is divided by the number of sections taken by students during three years from 2005 to 2007 in Texas.

Pass rate (A) indicates the pass rate in each quintile.
Pass rate (B) indicates the pass rate for two quintiles combined (top two and bottom two).
Diff indicates a difference in pass rates between the two combined quintiles.

*** Statistically significant at the .01 level.

Table 4 reports results of regression analysis. The academic preparedness of incoming students (Qstudent) is proxied by three variables: Below_M, Below_R and Fail_All. Consistent with the Pearson correlations in Table 2, the equation using Below_M as a proxy for student quality has the highest adjusted $R^2$ (0.402). In other words, the math deficiency ratio of incoming students explains 40.2% of accounting students’ successful bid for the CPA exam in our sample.

In equation (2), CPAPass is regressed on four proxies of the academic preparedness of incoming students (Below_R, Fail_All, Below_M and Top10). The estimated model has an adjusted $R^2$ as 0.49 which implies that academic preparedness of incoming students at Texas public universities explains almost 50% of accounting students’ successful attempt on the CPA exam.

Equation (3) includes the three proxies for educational quality in addition to the four proxies for the academic preparedness of incoming students. The adjusted $R^2$ of equation (3) increases students’ CPA exam success to .616 (.125 over the result based solely on incoming preparedness).
Table 4 Results from regressing the CPA Examination pass rate on proxies for academic deficiency and educational quality

<table>
<thead>
<tr>
<th></th>
<th>Equation (1)(^a)</th>
<th>Equation (1)(^b)</th>
<th>Equation (1)(^c)</th>
<th>Equation (2)</th>
<th>Equation (3)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercept</td>
<td>.484</td>
<td>.463</td>
<td>.505</td>
<td>.379</td>
<td>5.876</td>
</tr>
<tr>
<td></td>
<td>(15.87)***</td>
<td>(18.64)***</td>
<td>(17.03)***</td>
<td>(6.83)***</td>
<td>(2.60)**</td>
</tr>
<tr>
<td>Below_R</td>
<td>–.553</td>
<td>–.553</td>
<td>–.553</td>
<td>–.553</td>
<td>–.553</td>
</tr>
<tr>
<td></td>
<td>(–3.66)***</td>
<td>(–3.66)***</td>
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<td>(–3.66)***</td>
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<td>Fail_All</td>
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<td>(–1.56)</td>
<td>(–1.74)</td>
<td>(–4.05)***</td>
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<td>Below_M</td>
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<td>–.604</td>
<td>–.531</td>
<td>–.512</td>
<td>–.512</td>
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<tr>
<td></td>
<td>(–4.53)***</td>
<td>(–1.83)</td>
<td>(–1.68)</td>
<td>(–4.53)***</td>
<td>(–4.53)***</td>
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<tr>
<td>Top10</td>
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<td>.505</td>
<td>.402</td>
<td>.491</td>
<td>.616</td>
</tr>
<tr>
<td></td>
<td>(2.53)**</td>
<td>(2.86)***</td>
<td>(2.61)**</td>
<td>(2.86)***</td>
<td>(2.86)***</td>
</tr>
<tr>
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<tr>
<td></td>
<td>(–.28)</td>
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<td>(–.28)</td>
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<tr>
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<td>.178</td>
<td>.178</td>
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<tr>
<td></td>
<td>(2.95)**</td>
<td>(2.95)**</td>
<td>(2.95)**</td>
<td>(2.95)**</td>
<td>(2.95)**</td>
</tr>
<tr>
<td>ADJ-R(^2)</td>
<td>.300</td>
<td>.347</td>
<td>.402</td>
<td>.491</td>
<td>.616</td>
</tr>
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</table>

Notes: QStudent\(_i\) – quality of students that were admitted to public university \(i\) in Texas. QStudent is proxied by Below_R [Equation (1)\(^a\)], Fail_All [Equation (1)\(^b\)] and Below_M [Equation (1)\(^c\)], respectively, for students in the fall 2003 cohort. All other variables are as defined in tables above.

* Statistically significant at the .1 level; ** statistically significant at the .05 level; *** statistically significant at the .01 level.

The presence of the multicollinearity problem between the variables in the models prevents us from properly interpreting the information content of individual independent variables. Nonetheless, a change in adjusted \(R^2\) of the model offers the ability of all independent variables in the model to explain the behaviour of the dependent variable (i.e. CPA Pass). From this perspective, we can conclude the math deficiency ratio of incoming students as one of the major factors to determine the pass rate of accounting students in their CPA examination at the university level and thus the research hypothesis in alternative form is empirically accepted.

Finally, we evaluated the validity of principal assumptions that underlie the estimation of equation (3) using the White test for homoscedasticity of the errors (White, 1980) and the Shapiro–Wilk test for normality of the error distribution (Shapiro and Wilk, 1965). Both tests reveal no violation of the assumptions.

5 Conclusions

This paper is an attempt to explain the CPA exam pass rate at 30 Texas public universities. Our investigation indicates that students’ pass rate is most significantly influenced by how well incoming freshmen students were academically prepared for college education. Therefore, students from institutions that admit well-prepared, college-ready students, in particular top 10% of high school students, are likely to have a higher CPA exam pass rate than students from less-selective institutions.
The quality of the accounting programme, as measured by the combination of faculty salary, number of accounting faculty and specialised accreditation in accounting (AACSB_AC), is also a relevant factor to explain the variation of students’ pass rate on the CPA exam. In particular, a high correlation between AACSB_AC and a CPA exam pass rate supports the claim of AACSB that it promotes quality education in accounting within its member universities. A more resource-rich institution can afford to consistently hire quality accounting professors, spend more resources on providing extra help outside of classroom to students preparing for the CPA exam and the like. All of these factors contribute positively to student success on the CPA exam. However, the impact of these variables on the CPA exam pass rate is remarkably less pronounced than the impact of incoming students’ academic preparedness by roughly a one-to-four ratio, e.g. 49% vs. 13% in terms of $R^2$.

An accounting programme that aspires to have a high pass rate on the CPA exam should selectively admit students who are highly prepared for college-level education and also should spend significant resources on assisting students’ preparation for the examination. Conversely, graduates of resource-poor accounting programmes that cannot attract well-prepared, college-ready students and/or do not have extra resources to help students to prepare for the CPA exam will continue to have a lower success rate on the CPA exam. Rather than focusing on CPA-preparedness, less resource-rich and open-admission institutions should necessarily focus on the primary objective of the accounting curriculum, which is to equip students with the skills and knowledge appropriate for carrying out a broad range of accounting functions in business and industry. Perhaps the most significant conclusion from this research is that one should be careful not to assess the quality of accounting education provided by a Texas public university based solely on the CPA exam pass rate of its accounting graduates.

This study suggests two implications to college administrators in the course of accepting new students and organising remedial programmes in the area of academic deficiency. First, college administrators need to establish optimal admission standards to recruit students who are able to absorb the quality of college education that is mandated by their college’s educational missions. Second, college administrators should consider customised remedial services for incoming students with academic deficiencies and providing services appropriate for the strengths, talents and interests of individual students. In particular, as at-risk students need more direct guidance and assistance to make progress in learning, they could experience great benefits through alternative learning methods, such as tutoring, mentoring, job shadowing and experiential education.

Finally, this study’s findings should be interpreted with some caution because of two underlying assumptions. First, university-wide data are used as a proxy for educational quality of the accounting programme, assuming that the proportional relationship in educational quality between an accounting programme and university-wide programmes would be stable across public universities in Texas. Second, a CPAPass per institution is stable over a number of years. These assumptions are imposed because the archival databases used for this study do not provide the variables needed. Thus, future research could extend the findings of our study by adopting more direct measures of educational quality, such as surveying accounting students or CPA examination candidates for their academic achievements. Also, a longitudinal study could be another option by following the academic progress of individual accounting students from their matriculation to their candidacy for the uniform CPA examination. We leave these alternative research methods for future research.
References


