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Gender and Other Determinants of CPA Exam Success: A Survival Analysis

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Abstract

The purpose of this study is to examine the influence of individual, institutional, and jurisdictional factors on the probability of passing the Uniform Certified Public Accountant Examination. This is an important subject because the CPA designation is the most valuable credential for advancing an accounting professional's career. Therefore, an understanding of factors that influence CPA exam success is essential.

Using survival analysis and a large sample from NASBA of CPA exam candidate sittings from 2005-2013, the current study shows that the candidates were more likely to succeed on the CPA exam if they were male, younger, received a degree from a college or university with an AACSB accredited business school and separately AACSB accredited accounting program, and received a degree from a private college or university. Also, the more times that candidates sat for a section the less likely they were to pass the given section and the exam as a whole. Interestingly, candidates who sat for the exam in jurisdictions that have the 150 hour to sit requirement were no more likely to pass any part of the exam than candidates sitting in jurisdictions without the 150 hour to sit requirement.

Introduction

The purpose of this study is to examine the influence of individual, institutional, and jurisdictional factors on the probability of passing the Uniform Certified Public Accountant (CPA) Examination. This is an important subject because the CPA designation is the most valuable credential for advancing an accounting professional's career. CPAs earn the highest salaries, and earn the best employment placements. Therefore, understanding factors that influence CPA exam success is essential in the current competitive economy with its shortage of qualified

accountants (ManPowerGroup 2013). Conversely, understanding factors that characterize underperforming candidate groups may be the catalyst for further inquiry and intervention.

Specific factors addressed in this study include: gender, age, type of educational institution, institutional AACSB accreditation, number of exam sittings, and the 150-hour requirement. These factors have been identified as important by the prior literature discussed in the next section. While all of these factors have been previously studied, they have not been studied simultaneously but rather in isolation, they have typically been studied under short windows of time, they have mostly been limited to data from only one state, and they have not been studied in light of the effects of time on success.

This study extends the CPA exam and diversity literature in several areas. The tested factors were examined simultaneously on the most complete dataset to date. The initial data were provided by the National Association of State Boards of Accountancy (NASBA) and included results of every exam section sitting for all exam candidates sitting for any section of the exam from 2005-2013.

The models developed for the individual exam sections and the complete exam were developed using survival analysis. Survival analysis incorporates changes in the probability of success over time into the models (Chi et al. 2013). The inclusion of changes over time is crucial in examining factors influencing CPA exam success because the candidates can sit for the exam sections multiple times with restrictions on the time between sittings. The number of sittings is used as a control variable, as candidates would be expected to become more familiar with the exam as they take it more often and prepare for the next sitting.

The results show that gender, age, AACSB accreditation, private university structure, and the number of sittings by the candidate are significant influential determinants of CPA exam success. Candidates were found to have higher probabilities for success on the CPA exam if they were male, younger, received a degree from a college or university with an AACSB accredited business school and separately AACSB accredited accounting program, and received a degree from a private college or university. Also, the more times that a candidate sat for a section of the exam the less likely they were to pass the given section and the exam as a whole. Interestingly, candidates who sat for the exam in jurisdictions that have the 150 hour to sit requirement were no more likely to pass any part of the exam than candidates sitting in jurisdictions without the 150 hour to sit requirement. However, no evidence is provided on whether the 150 requirement affects the probability of passing the CPA exam.

The remainder of the study is organized as follows. In Section 2, the literature is reviewed and the hypotheses are developed. The methodology is explained in Section 3. Section 4 presents the results and Section 5 concludes the paper.

Literature and Hypotheses Development

This section examines the literature regarding the CPA exam and the various variables of interesting, gender being the foremost variable. Most studies of CPA exam results have focused on the impact of the 150 hour requirement and various characteristics of educational institutions, and, less frequently, on individual characteristics of exam candidates. First, a brief overview of the CPA exam pass rate literature is provided, then each of the variables of interest are addressed.

Studies of CPA Exam Candidates

CPA exam pass rates and performance have been the focus of several research projects (Dunn and Hall 1984; Allen and Woodland 2006; Boone et al. 2006; Barilla et al. 2008; Dunn and Hooks 2009). While the extant research has analyzed many factors that influence CPA exam pass rates and performance, the projects have been relatively narrowly focused and have often used data from the exams of only one state. Allen and Woodland (2006) who used NASBA data from 1991-2002, Dunn and Hooks (2009) who used NASBA data from 2007, Jacob and Murray (2006) who use NASBA data from 1992-2004, Yunker (2005) who used NASBA data from 2001-2002, and

Raghunandan et al. (2003) who used NASBA data from 1996-1998 are exceptions to the use of only one state, as they used data from a large number of states.

The only study of CPA exam performance that has attempted to address gender is Brahmasrene and Whitten (2001) who surveyed Indiana CPA candidates. They found that female respondents were not as successful on the CPA exam as male respondents. Of course, this might just reflect the fact that women who have been unsuccessful on the CPA exam are more likely than similarly unsuccessful men to complete a survey about their performance. Clearly, an empirical study of actual pass rate data may shed light on any gender differences in CPA exam performance.

Gender

Gender is a recognized factor contributing to success in grade school and university, with females, generally, performing better in school (attentiveness, task persistence, eagerness to learn, learning independence, flexibility and organization) while males generally perform better on standardized tests; these gender differences persist across various racial groups (Ryan and Ryan 2005; Cornwell et al. 2013).

In contrast to the current female majority in accounting programs (and in universities overall), during the 1990s women were less likely to earn graduate business degrees. During that period, (Hancock 1999) found that women performed significantly lower on the GMAT (Graduate Management Admissions Test), but performed similarly to men in MBA programs (vis-a-via GPA). Many standardized tests, such as the SAT and the ACT, have been shown to underpredict the abilities of female candidates (FairTest 2007). However, more recent studies of other professions with rigorous standards have found that males appear to perform better on standardized exams (such as state board clinicals for dentists in Florida) and, after controlling for predictive factors, gender is no longer a significant variable (Stewart et al. 2006).

While gender has been widely studied in secondary and higher education performance, as well as in performance in other professions and professional exams, gender has not been studied systematically relative to CPA exam performance. Brahmasrene and Whitten (2001) investigated the likelihood of CPA exam success using a number of factors collected via surveys of candidates who took the May 1998 exam in Indiana. They found that males were more likely to pass the CPA exam than females. Recent data from NASBA (Suh 2013) clearly shows females performing below males. Similarly, in the current study, differences in exam pass rates according to gender are expected. Formally, hypothesis 1 states that:

> H1: Male candidates will have a higher probability for success on the Uniform CPA Exam than female candidates.

The above studies, however, consider gender in isolation from other confounding and interactive factors. It is widely accepted that gendered patterns of performance are often related to a complex array of conditions. The gender gap may persist across many demographic characteristics, including family income, family education, grade point average, class work, class rank, school size, hometown size, etc. (Fairtest 2007). Some subsets of candidates may be more likely, for example, to delay taking the exam after graduation due to family or community responsibilities or financial limitations (OECD 2012). Specific to the success of CPA candidates, male candidates may, however, be more likely to be employed by the larger firms, and therefore may receive better support leading to CPA exam success.

Age

Any discussion of gender necessitates an analysis of age. Differences in age bring many differences in life across gender. While male candidates in general are generally less likely to have children and be single parents than women, age is a factor that can stand alone and is easily controlled for in the analysis. Older candidates are more likely to have families or other domestic responsibilities than younger candidates. However, older candidates could also be expected to be more mature and have better study habits (Brahmasrene and Whitten 2001).

Only one relatively recent study of CPA exam success has considered age. Brahmasrene and Whitten (2001) found that older candidates outperformed younger candidates. Unfortunately, the study was limited by age not being a continuous variable, as candidates were categorized as either over 26 years of age or under 26 years of age, thus their conclusion regarding age must be carefully considered.

Furthermore, as candidates increase in age they are also likely to be getting further from the time of their formal education and may require more study time to prepare for the exam that may not be available to them due to other aspects of their life. Given the likelihood of older candidates having much more personal and professional stress and responsibility, differences in exam pass rates according to age are expected. Thus, hypothesis 2 formally states that:

> H2: Younger candidates will have a higher probability for success on the Uniform CPA Exam than older candidates.

AACSB Accreditation

The highest level of business accreditation is AACSB accreditation, which schools may earn in business and, separately, in accounting. Less than 10% of business schools have earned this distinction, which is considered to be an indicator of quality. Accounting programs that have received separate AACSB accounting accreditation are considered to be the highest quality accounting programs.

In addition, AACSB accredited schools tend to attract better students and their graduates are more heavily recruited by large firms. Self et al. (2013) showed a positive effect on CPA exam pass rates for accredited institutions. Morgan (2011) studied newly AACSB accredited schools both before and after initial accreditation and found that AACSB accreditation has a positive impact on CPA exam success rates.

Due to the higher quality business schools being accredited, the highest rated accounting programs being separately accredited by the AACSB, and these higher quality programs attracting higher quality students, one can expect that graduates of these programs will have a greater probability of success on the CPA exam. Formally, hypotheses 3 and 4 state that:

> H3: Candidates who received their college or university education at a college or university with an AACSB accredited business school will have a higher probability for success on the Uniform CPA Exam than candidates whose college or university did not have an AACSB accredited business school.

> H4: Candidates who received their college or university education at a college or university with a separately AACSB accredited accounting program will have a higher probability for success on the Uniform CPA Exam than candidates whose college or university did not have a separately AACSB accredited accounting program.

University type (Public v. Private)

Yunker (2005) addresses the importance of institutional variables on the quality of graduates and thus their performance on the CPA exam. Similarly, differences in education provided at private universities with their generally smaller class sizes (Linquist and Smith 2013) and better funded programs are expected in comparison with public universities, which tend to have larger class sizes and less funding. Likewise Boone et al. (2006) concluded that students from more selective universities were more likely to pass the CPA exam. Therefore, the hypothesis 5 states that:

> H5: Candidates that received a degree from a private college or university will have a higher probability for success on the Uniform CPA Exam than candidates that received all of their post-secondary degrees from public colleges or universities.

150 Hour to Sit Requirement

The 150 hour requirement has been in force in the majority of U.S. jurisdictions for some time. Several studies have reported a positive effect of this requirement, such as better student quality (Nelson et al. 2008; De Berry 2003; Raghunandan et al. 2003) and rising CPA exam pass rates (Cumming and Rankin, 1999; Allen and Woodland, 2006, 2012). Only Gramling and Rosman (2009, 2013) appear to provide to dissent on the subject of the 150 hour requirement. Most of the debate about the 150 hour requirement, however, has centered around the supply of candidates, not their quality or exam success. Thus, hypothesis 6 states that:

> H6: Candidates sitting for the Uniform CPA Exam in jurisdictions with the requirement of 150 hours to sit for the exam will have a higher probability for success on the exam than candidates sitting in jurisdictions that do not have said requirement.

Research Method

The data are described in the following section, then the model used to test the hypotheses is explained.

Data

NASBA provided anonymized data on CPA candidates who sat for the exam from 2005-2013. The individual variables of interest include gender and age, institutional variables including whether the college or university attended by the candidate is private or public, AACSB accreditation status, and the number of sittings for each section of the CPA exam.

The initial dataset included 397,918 unique candidates and 2,039,652 sittings for individual sections (observations). Cleaning of the data resulted in several observations being removed. The total number of sittings per candidate ranged widely, so the observations of candidates that sat for an excessive number of section sittings (330,857 observations) were removed.[1] Observations were removed for missing values in items reported by the candidates, including gender (72,567), degree (74,556), and age (1,280). Observations where the candidates did not report the college or university where they received a degree or did not have at least one degree from a US-based college or university (364,177) were removed. If it was not known whether the candidates college or university was private or public (40,245), the observations were removed. The final total number of observations equals 1,155,970 from 259,778 candidates. Table 1 contains details of the dataset reduction.

The data were split into individual datasets for each section and a dataset for the complete exam, which were used for model development. Each of the four section specific datasets contained only one observation for each candidate, while the complete exam dataset contained only those candidates that sat for all four sections of the exam at least once. The datasets contained the following number of candidate observations: Auditing and Attestation (AUD) 205,785; Business Environments and Concepts (BEC) 208,630; Financial Accounting and Reporting (FAR) 199,741; Regulation (REG) 197,859; and Complete Exam 155,548.

Methodology

The following model was used to test the variables hypothesized to influence candidates' probability of CPA exam success:

$$h(time) = h_0(time)\exp(\beta_1 Gender + \beta_2 Age + \beta_3 AACSB\text{-}Accounting + \beta_4 AACSB\text{-}Business + \beta_5 Private\ University + \beta_6 150\ Hours\ to\ Sit + \beta_7 Sittings + \beta_8 Gender{*}Age)$$

where:

[1] An excessive number of sittings is defined as in excess of 2 standard deviations (1 standard deviation = 3.88) of the mean number of sittings (5.13).

time	=	One plus the number of months between the candidates' first sitting for the respective section and the sitting in which they first passed the section or quit taking the section
Gender	=	Dummy variable coded as 1 = Male and 0 = Female
Age	=	Continuous variable for candidates age in years
AACSB-Accounting	=	Dummy variable coded as 1 if the candidate received at least one of their degrees from a college or university where the accounting department is accredited by the AACSB and 0 otherwise
AACSB-Business	=	Dummy variable coded as 1 if the candidate received at least one of their degrees from a college or university where only the business school is accredited by the AACSB and 0 otherwise
Private University	=	Dummy variable coded as 1 if the candidate received one of his or her degrees from a private university and 0 otherwise
150 Hours to Sit	=	Dummy variable coded as a 1 if the state in which the candidate registered to sit for the exam requires 150 hours to sit for the exam and 0 otherwise
Sittings	=	For the individual section exams, a sitting is counted for each time a candidate sat for an individual section of the exam up to and including the first time they passed that section or quit taking it if they never passed that section exam. For the complete exam, sittings is the total number of every sitting of every section exam for the candidate.

Survival analysis was used to develop the models for examining possible explanatory factors for successful passing of the CPA exam. Survival analysis was chosen due to it being designed to "analyz[e] the time to the occurrence of an event (Cleves et al. 2010, 1). The Cox Proportional Hazards Model was used to develop the tested models (Cox 1972). Unlike OLS and Logistic regression, which "estimate coefficients at some fixed point in time", the inclusion of time in the survival model takes into account the changes in the candidate's probability of passing the exam over time (Chi et al. 2013, 104). While survival analysis is primarily used in medical research, it has been used in the field of accounting research to study audit staff reduction (Chi et al. 2013).

The time variable for the individual section datasets is calculated as one plus the number of months between the candidates' first sitting for the respective section and the sitting in which they first passed the section or quit taking the section. Adding one to the number of months allowed for a reasonable measure of study time before taking a given section and for a measure of time to be included in the time for those who only took a given section one time. Time and whether or not the candidate passed the given section or complete exam are combined to yield the dependent variable in the model.

The independent variables include items relating directly to the candidates, institutional items relating to the candidates' colleges or universities, and items related to the jurisdictions' requirements for sitting for the CPA exam. Self-reported items relating directly to the candidate are their *Gender* and *Age*. Prior research has shown an interaction between gender and age on performance. For example, research has shown a significant gender by age interaction for medical students and clinical performance (Haist et al. 2000). Therefore, the variable *Gender*Age* was created to examine the possible interaction.

The number of *Sittings* per section and for the entire exam are calculated for the individual section datasets as the number of sittings in the sample time window up to and including the sitting in which the candidate first passed the respective section or stopped taking that section exam. For the complete exam dataset, *Sittings* was defined as all sittings in the sample time window for which the candidate had reported scores. *Sittings* in the complete exam dataset would include retakes for a section that had been previously passed, but had to be retaken if the candidate did not pass all sections within the required 18 month time period for passing the entire CPA exam.

The institutional variables relating to the candidates' self-reported colleges and universities were provided by NASBA. Accreditation was examined by using dummy variables for *AACSB-Accounting* if the candidate received their accounting education in an accounting department with AACSB accreditation and by *AACSB-Business* if a candidate's business school only was AACSB accredited. Institutional affiliation was examined with the dummy variable *Private University* coded as a one if the candidate received a degree from a private college or university and a zero otherwise.

Jurisdictional requirements were analyzed using the variable *150 Hours to Sit*. This variable was coded as a one if the candidates' jurisdiction had the 150 hour requirement to sit for the CPA exam and zero otherwise.

The number of *Sittings* is included as a control variable since the number of sittings varies by individual. A sitting is counted for each time a candidate takes an individual section of the exam.

Empirical Results

The first results provided are the extensive descriptive statistics. Subsequently, the results of the hypothesis testing are described.

Descriptive Statistics

Table 2 reports the descriptive statistics of the candidates for the individual section exams and the complete exam datasets. Panel A provides results for the categorical variables. Sample demographics are very similar across exam sections and the complete exam with passers outnumbering those who failed by almost three to one.[2] Males and females were relative evenly split with females outnumbering males on all of the individual sections except for BEC. However, there were more males than females that sat for all four sections of the exam.

The categorical institutional variables show that candidates from separately AACSB accredited accounting departments made up approximately 46.8% of the overall sample, candidates from business schools with only AACSB accreditation for the business school made up approximately 32.4% of the sample, while the remainder of the sample (≈ 20.8%) did not receive a degree from an AACSB accredited business school or accounting department. Also, candidates receiving at least one degree from private colleges or universities (≈ 33.2%) were outnumbered two to one by those receiving all of their degrees from public institutions (≈ 66.8%).

The majority (≈ 88.4%) of the candidates took the exam in jurisdictions that do not have the 150 hour requirement to sit for the CPA exam, while the remainder (≈ 11.6%) took the exam in jurisdictions requiring 150 hours to sit for the exam.

As seen in Table 2: Panel B, the average candidate was approximately 28 years old and sat for each section either 1 or 2 times over a time period of just over 4 months. Analyzing age across gender (see Table 3: Panel C) shows that female candidates are significantly older than male candidates. The difference is approximately 4.2 months.

Correlation coefficients for the complete exam dataset are presented in Table 3. The correlations for the majority of the comparisons are significant. However, none of the correlations are above the 0.80 rule-of-thumb of Gujarati

[2] Analysis of the pass rates in Table 2 indicate a possible disparity between the tested samples and the actual pass rates from NASBA. This disparity does not actually exist. The original data were obtained from NASBA and included scores for every sitting per section of the exam during the respective period, thus having the actual pass rates presented by the AICPA and NASBA. In the tested datasets, each candidate is only in the datasets one time for each section of the exam that they took and in the "complete" dataset if they took all four sections of the exam, with their number of sittings for a respective section included as an independent variable. The candidates were classified as "Passing" if they ultimately passed the respective section, which is not an indication of their performance on any individual sitting, as they may have taken a given section multiple times.

(2003). The correlation matrices for the individual sections datasets are very similar to that of the complete exam dataset and, for brevity, are not presented.

Hypothesis Testing Results

Results of testing the independent variables via survival analysis modeling are presented in Table 4. Regarding candidate specific variables, *Gender* was a significant influential variable for all individual section exams ($p < 0.01$), except for BEC ($p = 0.16$), and was significant for the complete exam ($p < 0.05$). Males were more likely to pass the individual section exams of AUD (11.9%), FAR (10.1%), and REG (12.05%), while on the complete exam males were 7% more likely to pass the exam than females. Hypothesis 1 was supported.

Age was a significantly and negatively influential factor ($p < 0.01$) in predicting success on the CPA exam. As candidates increase in age by one year, they were less likely to pass the section exams of AUD (-1.4%), BEC (-1.9%), FAR (-1.4%), REG (-1.3), and 2.2% less likely to pass the entire exam.

On the BEC section, *Gender* and *Age* had a significant interaction ($p < 0.01$). Thus, while candidates of neither *Gender* ($p = 0.16$) are more or less likely to pass the BEC section than the other gender, for males, for every year increase in *Age* they are 4.7% less likely to pass the BEC section than are females.[3] Hypothesis 2 was partially supported.

The institutional factors associated with the candidates' degree granting colleges and universities are also significant factors relating to the passing of the CPA exam. The coefficients for the accreditation variables of *AACSB-Accounting* ($p < 0.01$) and *AACSB-Business* ($p < 0.01$) are positively significant for all of the individual section exams and the complete exam. The affiliation variable (*Private University*) ($p < 0.01$) is also positively significant in every model.

Candidates who received a degree from a college or university with the college of business accredited by the AACSB were 11.08% - 14.9% more likely to pass any or all of the CPA exam than candidates that received degrees from colleges or universities that had no AACSB accreditation. Candidates educated in separately AACSB accredited accounting departments were 19.1% - 23.83% more likely to pass any section or all of the CPA exam. Hypotheses 3 and 4 were supported.

Furthermore, if the candidates received at least one of their college or university degrees from a private school they were 2.20%-3.19% more likely to pass an individual section exam than candidates who attended only public colleges or universities and were 3.83% more likely to pass the complete exam. Hypothesis 5 was supported.

The jurisdictional variable of the requirement to *150 Hours to Sit* for the CPA exam was not a significant factor for success on the exam. The p-values for the individual section exams are 0.681 (AUD), 0.289 (BEC), 0.427 (FAR) and 0.921 (REG) and for the complete exam the p-value equaled 0.798. Therefore, the requirement of 150 college or university credit hours being earned before a candidate can sit for the CPA exam does not influence the candidate's probability of passing the CPA exam.

Due to the controversial nature of the 150 hour requirement to sit for the exam, sensitivity analysis was performed to add evidence to support the findings of the tested models concerning the *150 Hours to Sit* hypothesis. Using a stratified random sample of 15,000 candidate observations from each dataset, the survival models were rerun and compared to the original models. For all of the models, all the significant variables remained significant, the signs of the coefficients remained the same, and the *150 Hours to Sit* variable remained insignificant with p-values of 0.440 (AUD), -0.769 (BEC), 0.843 (FAR), 0.373 (REG), and 0.604 (Complete Exam). Hypothesis 6 was supported.

3 The 4.7% less likelihood for males to pass BEC is calculated by summing the coefficients for the main effects of Age (-0.0190) and Gender (-0.0334) and the coefficient for the interaction Age*Gender (0.0053).

The control variable for the number of *Sittings* was a significantly and negatively influential factor on a candidate's probability of passing any and all of the CPA exam ($p < 0.01$). For every additional sitting for the section exams the candidates are between 107.5% and 118% less likely to pass the section. And for candidates that took all four sections of the CPA exam, each additional sitting for any section reduced their probability of success by 33.83%.

Discussion

This study provides an evaluation of the determinants of success on the Uniform CPA Exam. The factors determined to be influential were the candidate specific items of gender, age, and the number of times they sat for the exam sections; the institutional items of whether the candidate's college or university had an AACSB accredited business school or accounting program and whether or not it was private or public. Interestingly, the jurisdictional factor of the 150 hour to sit requirement was insignificant for all exam sections and for the entire exam. The results indicate that a candidate who is a young male who received his degree from a private college or university with a separately AACSB accredited accounting program and sat for each exam section only once had a higher probability for success on the exam than any other candidate.

Prior research on CPA exam success factors were extended by the current project on several fronts. The current study analyzed several factors simultaneously that have previously not be used together and did so using the largest known sample of CPA exam results to date. The original data was provided by NASBA and included all candidate exam sittings from 2005-2013 for NASBA assisted jurisdictions. Statistical models were built using survival analysis, which incorporates changes over time into the model, which is more informative than models built using only data from fixed points in time (Chi et al. 2013).

The study was limited by the lack of candidates from jurisdictions that are not assisted by NASBA. Future research could analyze a broader sample including all jurisdictions. Also, limiting the study was the choice to include only candidates that self-reported receiving at least one post-secondary degree from a college or university in the United States; future research could include candidates with only international degrees to the sample. Including the candidates' actual university/college level credit hours and whether or not the candidate participated in a CPA exam review course would also add to the study and should be addressed by future research. Finally, future research could include average class size, other accreditation bodies, and university funding levels in the analysis.

The results of the current project have broad implications for educators and exam preparers. Accounting programs need to be aware that a gender issue exists regarding the potential for success on the CPA exam and to examine their programs and materials to determine if there are areas for improvement that may address the influence of gender on exam success. Educators, firms, businesses, the AICPA and NASBA could develop strategies and materials that encourage the best and the brightest students and employees to consider accounting as profession and stress the importance of taking the CPA exam earlier in their career.

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Table 1: Dataset Reduction

Rational for Removal	Number of Observations* Removed	Number of Observations	Number of Candidates
Initial Number of Observations	n/a	2,039,652	397,918
Excessive number of sittings**	330,857	1,708,795	378,727
Gender not reported by candidate***	72,567	1,636,228	362,495
Both degrees from non-US schools or missing value***	364,177	1,272,051	284,170
Missing values for degree***	74,556	1,197,495	269,253
Missing values for age***	1,280	1,196,215	269,031
Missing value for affiliation**** of school	40,245	1,155,970	259,778

* An observation is a unique sitting for a given section by a given candidate.
** An excessive number of sittings is defined as in excess of 2 standard deviations (1 standard deviation = 3.88) of the mean number of sittings (5.13).
*** These items are self-reported by the candidates.
**** Affiliation refers to public or private school.

Table 2: Demographics of Candidates per Exam Section and the Complete Exam

Panel A: Categorical Variables

	Auditing and Attestation Model (AUD)	Business Environments and Concepts Model (BEC)	Financial Accounting and Reporting Model (FAR)	Regulation Model (REG)	Complete Exam**
# of Candidates Passing	150,890	154,131	145,586	147,553	124,941
# of Candidates Failing	54,895	54,499	54,155	50,306	30,607
Gender					
Male	102,428	103,448	100,040	98,814	79,661
Female	103,357	105,182	99,701	99,045	75,887
AACSB – Accounting*	92,183	92,669	89,795	88,866	72,839
AACSB – Business Only*	66,696	67,842	64,929	64,146	50,420
AACSB – None	46,906	48,119	45,017	44,847	32,289
150 Hours to Sit*					
Required	24,467	25,025	23,692	23,579	18,050
Not Required	181,318	183,605	176,049	174,280	137,498
University Type*					
Private	69,119	70,089	67,034	66,395	51,642
Public	136,666	138,541	132,707	131,464	103,906

n = (AUD) 205,785; (BEC) 208,630; (FAR) 199,741; (REG) 197,859; (Complete Exam) 155,548

* These variable are dummy variables with the following definitions:

AACSB – Business Only: 1 = The candidate received at least one of their degrees from a college or university where only the business school is accredited by the AACSB and 0 otherwise.

AACSB – Accounting: 1 = The candidate received at least one of their degrees from a college or university where the accounting department is accredited by the AACSB and 0 otherwise.

150 Hours to Sit: 1 = State in which the candidate registered to sit for the exam requires 150 hours to sit for the exam and 0 otherwise.

Private University: 1 = The candidate received one of his or her degrees from a private university and 0 otherwise.

** Complete Exam dataset included only candidates that had taken all four sections of the exam within an 18 month window.

Panel B: Continuous Variables

	Auditing and Attestation Model	Business Environments and Concepts Model	Financial Accounting and Reporting Model	Regulation Model	Complete Exam
Age*					
Mean	28.04	28.11	28.02	28.10	27.16
Standard Deviation	6.73	6.76	6.69	6.72	6.31
Months					
Mean	4.45	4.27	4.10	4.17	11.38
Standard Deviation	8.82	9.10	8.10	8.27	13.04
Sittings**					
Mean	1.44	1.41	1.41	1.44	5.79
Standard Deviation	0.78	0.79	0.75	0.77	2.16

* Age when candidate first sat for the respective section.

** For the individual section exams, a sitting is counted for each time a candidate sat for an individual section of the exam up to and including the first time they passed that section or quit taking it if they never passed that section exam. For the complete exam, sittings is the total number of every sitting of every section exam for the candidate.

Panel C: Age by Gender

	Auditing and Attestation Model	Business Environments and Concepts Model	Financial Accounting and Reporting Model	Regulation Model	Complete Exam
Age					
Female					
Mean	28.19	28.28	28.17	28.25	27.24
Standard Deviation	7.01	7.04	6.98	7.01	6.61
Male					
Mean	27.90	27.93	27.87	27.95	27.08
Standard Deviation	6.42	6.46	6.38	6.41	6.02
Difference* (Female-Male)	0.29	0.35	0.30	0.30	0.16
t-statistic	9.84**	11.81**	10.07**	9.88**	5.25**

* Difference = difference in mean beginning age
** p-value < 0.01

Table 3: Correlation Matrix for the Complete Exam Dataset

	AACSB – Accounting	AACSB – Business	Age	Gender	Private University	Sittings	150 Hours to Sit
AACSB – Accounting*	1.0000						
AACSB – Business*	-0.6499**	1.0000					
Age****	-0.0917**	-0.0021	1.0000				
Gender*	0.0415**	-0.0196**	-0.0134**	1.0000			
Private University*	-0.2190**	-0.0724**	-0.0136**	0.0078**	1.0000		
Sittings*****	-0.0651**	0.0154**	0.0296**	-0.0543**	0.0063***	1.0000	
150 Hours to Sit*	0.0667**	-0.0652**	0.0463**	-0.0160**	-0.0784**	0.0133**	1.0000

n = 155,548

* These variables are dummy variables with the following definitions:

Gender: 0 = Female and 1 = Male

AACSB – Business Only: 1 = The candidate received at least one of their degrees from a college or university where only the business school is accredited by the AACSB and 0 otherwise.

AACSB – Accounting: 1 = The candidate received at least one of their degrees from a college or university where the accounting department is accredited by the AACSB and 0 otherwise.

150 Hours to Sit: 1 = State in which the candidate registered to sit for the exam requires 150 hours to sit for the exam and 0 otherwise.

Private University: 1 = The candidate received one of his or her degrees from a private university and 0 otherwise.

** p-value < 0.01

*** p-value = 0.01

**** Age when candidate first sat for the respective section.

***** For the individual section exams, a sitting is counted for each time a candidate sat for an individual section of the exam up to and including the first time they passed that section or quit taking it if they never passed that section exam. For the complete exam, sittings is the total number of every sitting of every section exam for the candidate.

Table 4: Survival Analysis Results

	Auditing and Attestation Model (AUD)	Business Environments and Concepts Model (BEC)	Financial Accounting and Reporting Model (FAR)	Regulation Model (REG)	Complete Exam
AACSB – Accounting*	0.2325**	0.2383**	0.2312**	0.2228**	0.1910**
AACSB – Business*	0.1490**	0.1483**	0.1417**	0.1419**	0.1108**
Age****	-0.01382**	-0.0190**	-0.0139**	-0.0131**	-0.0218**
Gender*	0.1192**	-0.0334	0.1008**	0.1205**	0.0680***
Private University*	0.0244**	0.0235**	0.0220**	0.0319**	0.0383**
Sittings*****	-1.1473**	-1.0745**	-1.1799**	-1.1546**	-0.3383**
150 Hours to Sit*	0.0033	-0.0085	0.0065	-0.0008	0.0023
Gender*Age	-0.0005	0.0053**	0.0001	-0.0008	0.0005
Likelihood Ratio (LR) chi^2 test	53,343.92**	50,702.03**	49,838.05**	52,515.98**	49,933.82**

n = (AUD) 205,785; (BEC) 208,630; (FAR) 199,741; (REG) 197,859; (Complete Exam) 155,548

* These variables are dummy variables with the following definitions:

- Gender: 0 = Female and 1 = Male
- AACSB – Business Only: 1 = The candidate received at least one of their degrees from a college or university where only the business school is accredited by the AACSB and 0 otherwise.
- AACSB – Accounting: 1 = The candidate received at least one of their degrees from a college or university where the accounting department is accredited by the AACSB and 0 otherwise.
- 150 Hours to Sit: 1 = State in which candidate registered to take exam requires 150 hours to sit for the exam and 0 otherwise.
- Private University: 1 = candidate received one of his or her degrees from a private university and 0 otherwise.

** p-value < 0.01

*** p-value < 0.05

**** Age when candidate first sat for the respective section.

***** For the individual section exams, a sitting is counted for each time a candidate sat for an individual section of the exam up to and including the first time they passed that section or quit taking it if they never passed that section exam. For the complete exam, sittings is the total number of every sitting of every section exam for the candidate.