A DETERMINATION OF DIFFERENTIAL PREDICTABILITY OF SUCCESS INDICATORS FOR MALES AND FEMALES TAKING THE UNIFORM CERTIFIED PUBLIC ACCOUNTANTS EXAM

By
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A DETERMINATION OF DIFFERENTIAL PREDICTABILITY OF SUCCESS INDICATORS FOR MALES AND FEMALES TAKING THE UNIFORM CERTIFIED PUBLIC ACCOUNTANTS EXAM

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Judy Anne Ramage

We hereby certify that this Dissertation submitted by Judy Anne Ramage conforms to acceptable standards, and as such is fully adequate in scope and quality. It is therefore approved as the fulfillment of the Dissertation requirements for the degree of Doctor of Business Administration.

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1995

CERTIFICATION STATEMENT

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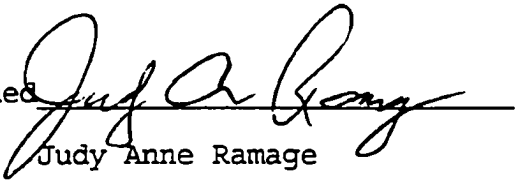
Signed 

Judy Anne Ramage

ABSTRACT

A DETERMINATION OF DIFFERENTIAL PREDICTABILITY OF SUCCESS INDICATORS FOR MALES AND FEMALES TAKING THE UNIFORM CERTIFIED PUBLIC ACCOUNTANTS EXAM

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Using stepwise regression techniques, models were produced to predict the success of males and females taking the Uniform Certified Public Accountants Examination. Additional tests to determine the presence or absence of differential predictability were then conducted. These tests were developed to determine if one model or separate models were necessary for males and females.

Data was obtained by means of a survey to candidates who sat for the exam in May of 1994, after completing a review course of at least 100 hours duration. The predictor variables considered were age, accounting experience, race, sex, ACT score, undergraduate grade point average (UGPA), and level of education. Because of a small number in the sample population, the predictor variable for race was eliminated. Also, due to high levels of correlation between age and experience, and ACT score and UGPA, the predictor variables age and UGPA were also eliminated.

The first model attempted to determine the variables that best predict success for all candidates taking the exam. The first variable to enter in the stepwise regression was the ACT score which explained 42.284 percent of the changes in the criterion variable. The second variable to enter was accounting experience which increased the $R^2_{Adjusted}$ to 0.45933.

A second model was developed for male candidates. Again, the first variable to enter was the ACT score which explained 44.858 percent of the changes in the criterion variable. No other variables entered.

A third model was developed for female candidates. As in the first two models, the first variable to enter was ACT. Like the first model, the second variable to enter was accounting experience. The two variables combined

explained 46.622 percent of the changes in the criterion variable.

Tests for differential predictability involved the development of an additional multiple regression that included sex as a dummy variable. This model had an $R^2_{Adjusted}$ of 0.46275. Using the results of an analysis of variance of the four models, a test of the homogeneity of variance between the male and female model was developed. This test, a two-tailed *F* test of the ratio of the male residual mean square to the female residual mean square failed to reject the null hypothesis of equal residual variances. The equality or inequality of slopes was developed using a one tailed *F* test of the differences in slope. The results of this test failed to reject the null hypothesis of equal slopes. The test of intercept was also a one tailed *F* test which again resulted in failure to reject the null hypothesis of equal intercepts. The results of the above three tests indicated that differential predictability was not present and the same model could be used to predict success on the exam for both males and females.

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Finally, to my three daughters, now you know where your mother has been these last few years.

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CHAPTER I

INTRODUCTION

Background of the Problem

For over 70 years the designation of "Certified Public Accountant" has been the benchmark of success in the accounting community. To achieve this recognition, candidates must pass a comprehensive examination designed to show both competence in accounting and a thorough understanding of the laws, principles, and standards that guide the profession. The CPA exam has been remarkably stable over the years both in terms of the format of the exam, the length of the exam, and the profile of the exam candidate. The last major change in the exam occurred in the 1950s when states generally began to require a baccalaureate degree as the minimum education level for all candidates.

Despite this past stability, at least three changes are now taking place that may significantly change the profile of the successful candidate on the exam. These changes include a modification in the requirements to sit for the exam, a

change in the exam format, and a continuing transformation in the gender makeup of the typical exam candidate.

The change in the requirements to sit began twenty-three years ago when the American Institute of Certified Public Accountants (AICPA) issued the Report of the Committee on Education and Experience Requirements for CPA's ("Committee on Education," 1969). This report said that candidates needed at least five years of college study to obtain the common body of knowledge necessary to be a Certified Public Accountant. Twelve years after the Committee submitted its report, the Committee on Professional Accounting Education of the American Institute of CPAs recommended the amendment of state laws to require post-baccalaureate studies as a prerequisite to sitting for the CPA exam ("Commission on Professional," 1983, p.2). Finally, in 1987, the AICPA Board of Directors endorsed a plan to require 150 hours of post-baccalaureate education for AICPA membership after the year 2000 (Ortinau, Engle, and Siebel, 1989, p. 86). As of the beginning of 1994, a minimum of 24 state boards of accountancy have addressed the issue and passed laws that at least partially require the additional hours recommended (Becker, Undated, p. 4). As of August of 1994, two states, Florida and Tennessee, have implemented the law. However, the Florida law differs significantly from laws

passed in other states. In Florida, the requirements state that a candidate must have completed at least 30 hours of college credit beyond the bachelor's degree (Anderson, 1988). In other words, if a student were to graduate from a baccalaureate program with 130 hours, that student would then be required to take an additional 30 hours for a total of 160 hours. While these hours must be taken after graduation, there is no requirement that they be taken at the graduate level.

The Tennessee law has no post-baccalaureate requirement. According to Dubke (1993), Tennessee requires only that the student have 150 total hours of credit from an accredited college or university that offers a baccalaureate degree. No graduate hours are required and the hours can be obtained either before or after graduation.

The Tennessee law is, therefore, very similar to the model accountancy law recommended by the American Institute of Certified Public Accountants (AICPA) and passed by most other states.

The second major change is in the format. This change became effective in May 1994 and consists of an expansion of certain accounting topics, the elimination of other topics, and an increased emphasis on skills not formerly tested.

For example, employers have, for many years, maintained that accounting skills were not the only ones required for success in the accounting profession. Donald Reigle (1991), Managing Director of Recruiting and College and University Relation for the Arthur Andersen public accounting firm, states that because of the expansion in services provided by CPA firms the skills needed by employees is also expanding. Reigle says that these skills include communication skills, both oral and written, team building and group participation skills, a solid grounding in economics and an understanding of some of the cultural differences which must be confronted in dealing with a global economy.

In response to such concerns, additional areas such as grammar, punctuation, sentence structure, organization, and the ability to write in a coherent manner will now be tested on at least a part of the CPA exam. Since past exams did not consider or grade writing skills, someone without these skills could take the exam without penalty. Under the new exam, those individuals with poor communication skills may now be at a disadvantage.

Another format change relates to the use of calculators. The rapid increase in the use of computers to perform repetitive tasks in accounting has served to make many of the

activities of the accountant obsolete (Wyer, 1993). In spite of this change, the old exam prohibited the use of calculators thus requiring the candidate to do all calculations by hand. The new exam recognizes that computers and calculators are an everyday part of accounting and they allow more detailed work in less time. Accordingly, calculators are now permissible, thereby taking away the advantage enjoyed by those who can do quick mental calculations.

Still another format difference is the trend in the last few years away from long, subjective questions to short multiple choice questions. When most research was done on candidate success, the exam was at least 40% subjective or problem oriented. In the new format, no section will be less than 80% objective and one part will be 100% objective. Past research (Gay, 1980) has shown that students who are successful on objective tests do not have the same profile as those who are successful on subjective tests. Furthermore, many researchers have recognized the theory of "test expectancy effect" with students preparing to sit for an exam (Apps, 1982, Meyer, 1934, Robinson, 1961). Test expectancy effect says that students who expect, and study for, an essay or subjective test will perform better than those preparing for a multiple choice or objective test regardless of the type

of test actually given. If test expectancy theory is correct, students may not perform as well on the exam simply because they are preparing for a multiple choice test.

The third major change in the exam relates to the gradual change in the gender makeup of the exam candidates. The CPA exam was for many years an exam taken primarily by males. However, beginning in the 1970s the number of female candidates began to rise. As of 1993, 54% of all baccalaureate accounting graduates were female, and while the public accounting profession now consists of 64% male employees, 49% of all new graduates employed in the public accounting profession in 1993 were female (Daidone, 1994).

This last change may greatly affect the predictors of success for the exam. Researchers have recognized for many years the hypothesis of differential validity (Linn, 1978) which suggests that predictors of success may be valid for one race, group, or sex and not be valid for another. So widely accepted is this theory that the Equal Employment Opportunity Commission requires the investigation of differential validity in employment tests whenever possible (Equal Employment Opportunity Commission, 1993).

Purpose of the Study

Recognizing the changes in candidate profile, the education level required, and the exam content, the purpose of this study was to determine the variables that influence success on the Uniform CPA Exam for all candidates and then determine the variables that predict success individually for males and females. These individual models were then examined for differential predictability by determining if they are significantly different in variability, slope, or intercept. This procedure required that if evidence of differential predictability was found it would be necessary to use two different models (one for males and one for females) rather than one combined model in predicting success on the CPA Exam.

Justification of the Study

One of the most significant professional events in the life of an accountant is passing the Uniform CPA Examination. Started in June of 1917, the CPA exam is considered a necessary credential in most professional jobs in public accounting and many other accounting positions in the private or governmental accounting area. Furthermore, research shows (Reichardt & Schroeder, 1994) that certification is the single most important salary factor for accountants, and "average

salary and average total compensation for individuals with CPAs are approximately $17,500 and $21,300 greater than those same compensation figures for individuals without any certification" (Reichardt & Schroeder, 1994, p. 24).

Who can or cannot pass the CPA exam is of interest to many. Of the 53,600 accounting graduates in 1990-91, over 18,000 were offered jobs by U.S. accounting firms (Daidone and Young, 1992). To succeed in public accounting both the employee and the employer know that the employee must eventually pass the CPA exam. The public accounting firms spend millions of dollars each year training their new employees in the hope they will pass the exam and remain as productive members of the firm. When candidates are unable to pass, they are often discharged or leave the firm voluntarily. The result is the loss of a substantial investment in training for the firm and perhaps the loss of alternate opportunities for the employee.

Researchers have long recognized the importance of identifying predictors of success on the exam. Specifically, researchers have attempted to find if there are readily available variables useful for prediction purposes, thus assuring the greatest success rate among those selected. Many past studies have attempted to isolate these variables. There

remains a continuing interest in these variables as the scope and emphasis of the exam changes.

The concern over the possible existence of differential predictability has also become much greater with the movement of the exam toward more multiple choice questions. Past research has indicated that the multiple choice format often seems to favor males over females (See, Hassmen & Hunt, 1994; Bridgeman & Lewis, 1994; Bolger & Kellaghan, 1990). Hassmen and Hunt (1994) found that while females receive higher grades in high school and college, they consistently receive lower grades than males on the Scholastic Aptitude Test (SAT). The SAT is a multiple choice test taken by over two million students each year. Bridgeman and Lewis (1994) found that this low level of predictability for multiple choice tests does not hold true for many types of essay tests. While researchers have not been able to agree on why women do not perform as well on multiple choice as essay, it is important to this study that apparently there is a difference in the way women take multiple choice tests and it may change the importance of previously accepted predictors. Since a review of the literature does not show any attempt to test for differential validity or differential prediction, an important element of prediction may have been left unstudied, especially

in light of the movement towards additional multiple choice questions.

Statement of the Problem

Significant changes in the CPA Exam format, and the requirements to sit for the exam raised concerns that currently accepted predictors of success on the exam may no longer be reliable. These changes are exacerbated by the view of many that the accounting profession is in a crisis that has forced firms to restructure and diversify their service offerings (Ahadiat and Smith, 1994). To attempt to cope with decreasing audit revenues, many firms are entering new areas such as management advisory services and financial planning. This has required new skills and talents on the part of new CPA's to meet this challenge (Ahadiat and Smith, 1994). The preparers of the CPA are attempting to measure these new talents with the exam.

A second problem that may exist on the exam is the concern that the exam may not be an accurate measure of these talents for both men and women. A review of the literature suggests that past research has not attempted to detect if differential validity or differential prediction is present in those predictors. Since current law often legally mandates

such studies, it is in the best interest of the accounting profession to find out if differential validity exists and, if so, to develop appropriate models to eliminate the effect of such differences.

Milieu of the Study

The study was conducted through a survey sent to candidates who sat for the Certified Public Accountants Exam in May of 1994 and received notice of grades earned in August of 1994. The names of these individuals were available from the National Association of State Boards of Accountancy (NASBA) who provided mailing labels for contacting candidates. Three sets of labels were obtained. Candidates were provided with a postage paid return envelope and a telephone number to call if questions arose. Because of an insufficient number of returns in the first mailing, a second mailing was sent to non-respondents. The third set of labels was held for tracking respondents and non-respondents. The data was recorded and aggregated using DBase III. Statistical analysis was done using the SPSS Release 4.0 for DECstation statistical program.

Scope and Limitations

Because it is the only state with a 150-Hour law now in effect that is similar to that recommended by the AICPA, this study considered only CPA candidates from Tennessee. This restriction eliminated candidates from other states and jurisdictions that offer the exam and accordingly may not make the data valid for nationwide application. However, in the national totals prepared by the National Association of State Boards of Accountancy (1993), Tennessee candidates did not perform substantially different from candidates-at-large before the change in the Tennessee law. If this comparability continues after the rest of the nation has implemented the law, the study may have use on a national basis.

Another limitation is that only candidates who have taken a CPA Review course were considered. This is an intentional limitation to eliminate those candidates who are taking the exam "for the experience." The results of the study therefore, apply only to those candidates who have made a bonafide attempt to prepare for the exam.

Assumptions of the Study

Past researchers in this area have had difficulty in isolating motivated candidates from those who are sitting for

the experience. This study assumes that students who enroll in, and successfully complete a CPA review course, are motivated to pass the exam and have taken the necessary steps to properly prepare.

The study also assumed that students responded truthfully to questions asked regarding grades received on the exam. Since the students were not identified in the study, they did not have reason for misreporting these scores.

Definition of Terms

Academic Rank: The numerical standing of the student's cumulative grade-point average in relation to the rest of the class. For example, the student with the highest cumulative grade-point average will receive a rank of one.

The American College Testing Program (ACT): A standardized college admissions test that, according to the Educational Research Service (1981), is designed to provide a "common currency" that allows admissions' officers and counselors to place students on the same footing regardless of social strata and geographic location.

American Institute of Certified Public Accountants (AICPA): The professional organization of practicing certified public accountants in the United States.

Certified Public Accountant (CPA): A person holding an official certificate as an accountant, having fulfilled all the legal requirements.

Cumulative Grade Point Average (GPA): Based on a 4.0 scale, this is the measurement used to express academic achievement in college.

Differential Prediction: A phenomena that occurs when a variable moderates a relationship between a predictor variable and a criterion variable, so that the predictors work differently for two or more groups of subjects.

Predictors: Those identified independent variables that declare in advance the success or failure of the candidate.

Scholastic Aptitude Test (SAT): A test similar to that described for the American College Test. Since over 90% of all Tennessee graduates sit for the ACT exam, students reporting an SAT score will have that score converted to an equivalent ACT score as defined by the American College of Testing.

Success: The attainment of an average score of 75 or more the Uniform CPA Examination.

Uniform CPA Exam: An exam recognized by all fifty states as the basic requirement for licensure to practice public accounting in the state.

Research Questions

The predictor variables examined in this study are undergraduate grade point average (UGPA), race, college admissions test score (ACT), experience in accounting, type of college degree and age of the candidate at the time of taking the CPA Exam. The criterion variable is average score on the CPA Exam.

The questions that were examined are:

1. What are the variables that predict success for all candidates taking the Uniform Certified Public Accountants Exam?
2. What are the variables that predict success for males taking the Uniform Certified Public Accountants Exam?
3. What are the variables that predict success for females taking the Uniform Certified Public Accountants Exam?
4. Is there a significant difference between the variables that predict success for all candidates and the variables that predict success for males and females taking the Uniform Certified Public Accountants Exam?

Organization of the Study

This study contains five chapters. Chapter 1 serves as an introduction to the subject by giving the background of the problem, the purpose of the study, a justification of the study, a statement of the problem, the milieu of the study, the scope and limitations of the study, and the assumptions made. A definition of unique terms is provided to assist the reader.

Chapter 2 contains a general review of the literature. The first section identifies the conceptual framework on which the study was based. The second section discusses earlier studies in accounting and the current status of research as it applies to predicting success on the Certified Public Accountants exam. The third section relates to the various research methods that have been applied to the problem and the differences these research methods have made in the final results obtained.

Chapter 3 contains a detailed analysis of the mathematical models used and the statistical analysis techniques and procedures used to address each of the research questions. This includes descriptive statistics, statistics used to show relationships, and an identification of the predictor models. A description of the population and sample,

the instrumentation, and the criterion variables are also given.

Chapter 4 contains the results of the study and an analysis of the findings. Each of the null hypotheses are stated and evidence presented that supports or rejects the hypothesis.

Chapter 5 presents the summary, findings, and conclusions of the study.

Chapter II

REVIEW OF LITERATURE

Conceptual Framework

Since the 1960s, there has been a belief among many researchers that test results are less valid for minorities than for members of other groups and that various tests can "function differently in one ethnic group population than the other..."(Katzell & Dyer, 1977, p. 143). This theory has been described as the hypothesis of differential validity and, if feasible, tests for differential validity have been required by the Equal Opportunity Commission (1970 & 1993) for many years.

Early Studies of Differential Validity and Differential Prediction

The study of differential validity in this country has generally paralleled the civil rights movement. Shortly after the Supreme Court struck down legal desegregation in 1954, Ghiselli (1956) studied the differentiation of individuals in terms of their predictability. Ghiselli theorized that

prediction is more accurate for some individuals than for others and that an examination of the magnitude of the scatterplot of predictor and criterion scores could enhance the accuracy of such predictions. Through a series of studies, Ghiselli (1956, 1960, 1963) developed a predictability scale that could give an indication of how accurate individual predictions might be.

Concerned about minority employment, discrimination, and affirmative action, numerous studies followed the work of Ghiselli. Almost immediately, the debate began about whether differential validity truly exists, and if so is it significant enough to cause serious problems? For example, Boehm (1977), and Schmidt, Berner, and Hunter (1973) found little evidence of differential validity and concluded that in those few instances found the cause was believed to be pure chance. In response to all the conflicting research, the editors of the Journal of Applied Psychology decided to publish a series of research studies presenting both sides of the question. Begun in April of 1977, and continuing to January of 1978, the articles did little to resolve the issue. The editors then invited Professor Robert Linn of the University of Illinois, Champaign to consider these articles

on single-group and differential validity and develop a position paper.

Linn (1978) evaluated the arguments pro and con for differential validity and concluded that the measurement of differential validity was too narrow in focus. Linn reported that in previous literature, differential validity was thought to be indicated by a difference in correlation coefficients. Linn felt that a true difference between groups occurred when there were also differences in standard errors of the estimate, differences in slopes, and/or differences in intercepts of regression lines. Linn pointed out that "equal correlations do not necessarily imply equal standard errors of estimate, nor do they necessarily imply equal slopes or intercepts" (1978, p. 511). Linn referred to this expanded theory as differential prediction. Many studies using this theory followed, and the subject matter of the research became broader and more widely used.

Using this expanded theory, Messmer and Solomon (1979) presented a method for testing differential predictability in a selection model. The authors obtained data from 227 graduate students of the College of William and Mary to determine characteristics for selecting students for admission into the graduate program. The authors then developed regression

models based on 103 male and 24 female graduates. The models were tested for equivalence of variance, intercept, and slope. The results of the study caused the authors not to reject the null hypothesis that there was no difference in the elevation and slope of the equations. They thus concluded that differential predictability was not present, and that the research supported the belief that one selection model could be used for both males and females in selecting students for graduate study. The model was then cross validated to the remaining 100 subjects (Messmer and Solomon, 1979).

Hendel and Doyle (1978) examined the predictive validity of the Admissions Test for Graduate Study in Business (ATGSB) and alternative predictors for English speaking and non-English speaking students in a Master's Degree Business Administration Program at the University of Minnesota. The authors chose seven criterion variables to represent a variety of indices of academic success. The criteria were first-quarter graduate GPA, cumulative graduate GPA, number of incomplete grades received, number of course withdrawals, number of credits completed with A or B grades, number of months elapsed from graduate entry to graduation, and graduation status as measured by whether the student had graduated as of a certain date (Hendel and Doyle, 1978). The

analysis consisted of the computation of bivariate product moment correlations and multiple correlation. The authors also did a double cross-validation when the multiple correlation was statistically significant. The results of the study caused the authors to conclude that no linear combination of predictor variables dependably predicted any of the available criteria. Moreover, the authors found that inspection of the bivariate correlations, "seemed to suggest that, if predictable at all, success for the two types of students would be differentially predictable and that the different criteria would be differentially predictable" (Hendel and Doyle, 1978, p. 414). The authors cited as an example of this that the test of differential predictability appeared to indicate that the ATGSB may potentially be a better predictor of success for students whose primary language is not English than for those whose primary language is English (Hendel and Doyle, 1978).

Other early researchers attempted to predict success in doctoral study (Vacc & Picot, 1984), graduation from a Master of Business Administration program (Breaugh and Mann, 1981), and student performance in a Counselor Education Master's Degree Program (Omizo & Michael, 1979). A review of the literature, however, does not show its use in attempting to

predict success on the Uniform Certified Public Accountants Exam.

Recent Studies of Differential Validity and Differential Prediction

A review of early studies of differential validity indicates that no common definition for either differential validity or differential predictability existed. A significant change took place in 1985 when the American Educational Research Association (AERA), the American Psychological Association (APA), and the National Council on Measurement in Education (NCME) developed a joint statement on differential validity and prediction. They stated that, "There is differential prediction, and there may be selection bias, if different algorithms (e.g. regression lines) are derived from different groups and if the predictions lead to decisions regarding people from the individual groups that are systematically different from those decisions obtained from the algorithm based on the pooled group" (AERA, APA, NCME, 1985, p. 12). The professional organizations further stated that since this definition of predictive bias implies that no bias exists if the predictive relationship of two groups being compared can be adequately described by a common algorithm,

then "differing regression slopes or intercepts are taken to indicate that a test is differentially predictive for the groups at hand" (AERA, APA, NCME, 1985, p. 13).

This joint statement spurred additional research in the area. In 1987, Houston and Novick addressed the general issue of differential prediction for blacks and whites by means of a detailed analysis of selected military training courses within the mechanical specialty area of the United States Air Force. Specifically, the authors wanted to find if the Mechanical Composite section of the Armed Services Vocational Aptitude Battery (ASVAB), commonly used to predict if applicants will succeed in various training specialties, was an equally effective predictor for blacks and whites. To do this, the authors developed separate scatterplots for each group to identify departures from the linearity and homoscedasticity assumptions of the regression models. The authors then utilized the Bayesian Johnson-Neyman methodology to determine if differential prediction existed. The authors determined that differential prediction did exist, but that it was highly dependant on the cut-score. Like earlier studies, Houston and Novick (1987), found that the tendency was for the slope to be somewhat flatter for blacks than for whites and that the regression equations for the prediction of success

were not coincident across races in the majority of training groups studied.

Poteat, Wuensch, and Gregg (1988) attempted to determine if standard IQ tests were accurately predicting the eligibility of minority students for special education. The authors noted that prior investigations of the correlation between IQ tests and standardized achievement tests had typically not produced evidence supporting the differential validity hypothesis. Poteat, Wuensch, and Gregg (1988) examined a sample of 168 (83 black and 85 white) elementary and middle school students to determine the relationship between IQ, California Achievement Test (CAT) scores, and grade point average. The authors found a significant relation between IQ test scores and grade point average for black and white students. The data confirmed earlier research that IQ is an equally valid predictor of academic achievement for the two groups.

In a study of the prediction of achievement by Asian-American and white children, Stone (1992) examined the relationship between a cognitive abilities battery, the Differential Ability Scales (DAS), and academic achievement as a function of race. The study used 1,731 white children and 48 Asian-Americans aged 6 to 17 years. The results of the

study indicated that for verbal skills the regression slope for Asian-American students was steeper than the slope for white students indicating that prediction error is greater for the Asian Americans when using a single predictor slope. For number skills, the two groups had equivalent slopes but different intercepts. The results show that the DAS overpredicts scores for white students and underpredicts scores for Asian-Americans. The results, therefore, indicate that prediction could be improved using different equations for the two groups.

During recent years, the study of differential validity has expanded into other areas. An example of this is a study by Fee, Matson, Moore, and Benavidez (1993) on the differential validity of hyperactivity/attention deficits disorder and conduct problems among mentally retarded children. The authors attempted to address the independence of these two variables using the factors of the Conners' Teacher Rating Scale-39 and the IOWA Conners' inattention/overactivity and aggression subscales. The results of the study show that "conduct problems are less strongly associated with hyperactivity and attention deficits among mentally retarded children compared to children of normal intelligence" (Fee, et al., 1993, p. 1).

Predictors of Success in Accounting

While a review of the literature does not indicate any tests for either differential validity or differential prediction on the CPA exam, accounting researchers have conducted many studies to find the variables that determine success on the CPA exam and the costs and benefits of additional mandated education. Three years after the Committee on Education and Experience Requirements for CPAs (1969) published its report, Reilly and Stettler (1972) presented a study on how certain variables correlate with test scores on the CPA examination. As expected, the study found a definite correlation between success on the CPA exam and candidates with high scholastic records and high SAT scores (Reilly & Stettler, 1972, pp. 308-309). On the other hand, the authors found consistently insignificant results for the effect of both the number of accounting hours taken and graduate study on CPA exam success (Reilly & Stettler, 1972, p. 309). Because of intercorrelation, the authors could not draw any conclusions for the effect of time out of school, work experience, and age. (Reilly & Stettler, 1972, p. 309). The authors attempted to determine whether the school the candidate attended or whether the candidate completed a CPA review course had a positive correlation, but couldn't isolate

the results for certain variables (Reilly & Stettler, 1972, p. 320).

Siegel (1987) conducted a study to determine the relation between the level of education and performance by auditors in the public accounting profession. Siegel studied three groups: (1) persons holding a bachelor's degree in accounting, (2) persons holding an M.S., M.Acc., or M.P.A. in accounting, and (3) persons holding the M.B.A. with an emphasis in accounting (Siegel, 1987, p. 130). He concluded that persons in the master's group received better overall performance reviews than those in the bachelor's group (Siegel, 1987, p. 138) and that the master's group had a lower turnover rate on the job than the bachelor's group (Siegel, 1987, p. 139). The results also forced the author to not accept the null hypothesis that no difference exists between the three groups' promotion to senior and manager (Siegel, 1987, p. 139). Owing to a low number of samples, the author couldn't draw any conclusions regarding promotion to partner (Siegel, 1987, p. 139).

Titard and Russell (1989) attempted to determine if an advanced degree, a high grade point average (GPA), public accounting experience, or a CPA review course affected CPA examination success. The authors found that success on the

exam had a strong correlation between the advanced degree and a high GPA but the effect of public accounting experience was mixed (Titard & Russell, 1989, p. 54). Candidates in public accounting had slightly higher pass rates on the auditing and practice parts of the exam, but lower pass rates on the theory and law portions (Titard & Russell, 1989, p. 55). The authors also concluded, with a greater than 99% confidence, that a CPA review course is a positive factor in passing the CPA exam (Titard & Russell, 1989, p. 57). Ortinau, Engle, and Siebel (1989) investigated the attitude of public accountants in Florida regarding the costs and benefits of mandated post-baccalaureate education. The study found that producing and attracting better qualified people to the profession and significantly improving the overall image of the profession were the two most important outcomes of the 150-hour laws (Ortinau et al., 1989, p. 90).

Deppe, Smith, and Stice (1992) examined "the differences in salary, promotions, CPA pass rates, and turnover between bachelor's and master's degree graduates of the School of Accountancy and Information Systems at Brigham Young University for the period 1979 to 1988." Deppe et al. (1992) found that while master's graduates begin at higher starting salaries in nearly every year and in every type of firm, the

master's degree provided little advantage in achieving faster promotions, and that no significant difference existed in the CPA exam success rate. Likewise, no statistically significant difference existed between the average length of employment for bachelor's and master's graduates (Deppe et al., 1992, p. 30).

Research Methods in Accounting

Most early accounting researchers directed their efforts at determining the variables that influence success on the CPA exam. Examples of this are Reilly and Stettler (1972), Titard and Russell (1989), Dunn and Hall (1984), and Trump and Sweeney (1972). This research confirmed some widely held beliefs. For example, all researchers found that scholastic aptitude, as evidenced by a high GPA, was a positive indicator of success on the exam (Dunn & Hall, 1984; Reilly & Stettler, 1972; Titard & Russell, 1989).

Dunn and Hall (1984), Titard and Russell (1989), and Trump and Sweeney (1972) found that taking a CPA review course improved success on at least some parts of the exam. However, Reilly and Stettler (1972) could not determine a similar relationship between these two variables.

The authors felt that a general belief existed among accountants that experience was a positive indicator on the exam; however, their studies failed to find this relationship for all parts of the exam (Dunn & Hall, 1984; Reilly & Stettler, 1972; Titard & Russell, 1989; Trump & Sweeney, 1972). Trump and Sweeney (1972, p. 88) speculated that the knowledge and skill acquired from work experience are offset by loss of knowledge acquired in college and a diminished ability to take academic tests.

The major discrepancies in the research involved the effect of additional accounting hours and graduate study on exam success. Reilly and Stettler (1972, p. 309) found consistently insignificant results for both of these variables. In the same year, Trump and Sweeney (1972, p. 86) arrived at the same conclusion for additional accounting hours but found a strong correlation between graduate study and success on the exam. Dunn and Hall (1984, p. 681) reported that their results were contrary to those of Reilly and Stettler (1972) because they found a positive correlation between additional hours in both graduate and undergraduate accounting (Dunn & Hall, 1984). Titard and Russell (1989) also found that graduate study had a positive influence on the exam.

Perhaps recognizing the concern about the 150-Hour requirement, a different research objective has recently became evident. Arnold and Geiselhart (1984), Siegel (1987), Anderson (1988), Deppe et al. (1988), Deppe et al. (1992), Ortinau et al. (1989), and Acton and Davidson (1989) studied the effect of post-baccalaureate study on a broad array of positive employment experiences in the accounting profession including turnover rates, differences in salary, number of promotions as well as success on the CPA exam. Two of these studies (Anderson, 1988, p. 59; Deppe et al. 1992, p. 27) confirmed earlier studies that found a correlation between graduate study and success on the CPA exam.

Siegel (1987, p. 136-7) found that employees with master's degrees have lower turnover on the job and receive more promotions (Siegel, 1987, p. 136). Deppe et al. (1992, p. 27) supported Siegel's (1987) earlier finding that master's candidates have lower turnover on the job, but neither Deppe et al. (1992) nor Ortinau et al. (1989) concurred with Siegel's (1987) finding that master's students receive more promotions. Both Deppe et al. (1992, p. 27) and Ortinau (1989, p. 91) found little advantage in promotions for master's graduates and any early advantage diminished in the long run.

A benefit of post-baccalaureate study for the student is the promise of a better salary because this allows the student to recoup his or her investment in the extra education and the loss of salary during the fifth year. Ortinau et al. (1989, p. 91) found that practitioners believe that salaries will be higher for employees with this additional education but Deppe, et al. (1992, p. 21) could not confirm this. Deppe, et al. (1992) found that although the beginning salary was higher for the master's student that difference quickly diminished and that in some cases the bachelor's salary was actually higher.

Conclusion

Researchers have found many variables that have a significant relationship with success in the accounting profession and on the CPA exam. However, changes in the Certified Public Accountants Exam, the candidate profile, and the recent initiative of the AICPA requiring additional study to sit for the CPA exam and to be a member of the institute have raised many questions about the continued validity of these predictors.

The review of literature also indicates that none of the researchers in accounting chose to find out if differential predictability was moderating the relationship between any of

the predictor and criterion values. Since this could cause a predictor to work differently for different groups of applicants, it may be more accurate to use different regression equations for the different groups taking the exam.

Chapter III

METHODOLOGY

Introduction

The methodology used in conducting this research consisted of identifying the population and sample, finding the appropriate instrumentation, and development of a procedure for analyzing data. Recall that in this research there are four research questions.

1. What are the variables that predict success for all candidates taking the Uniform Certified Public Accountants Exam?
2. What are the variables that predict success for males taking the Uniform Certified Public Accountants Exam?
3. What are the variables that predict success for females taking the Uniform Certified Public Accountants Exam?
4. Is there a significant difference between the variables that predict success for all candidates taking the exam and the variables that predict

success for males and females taking the Uniform Certified Public Accountants Exam?

Null and Alternative Hypotheses

The above research questions were used to develop four different null hypotheses.

1. There is no significant relationship between any of the selected predictor variables for all candidates taking the Certified Public Accountants Exam.
2. There is no statistically significant relationship between any of the selected predictor variables for males and success on the Certified Public Accountants Exam.
3. There is no significant relationship between any of the selected predictor variables for females and success on the Certified Public Accountants exam.
4. There is no significant difference between the predictors of success for all candidates taking the exam and the predictors of success for males and females taking the Certified Public Accountants Exam.

The alternative hypotheses can then be described as:

1. There is a significant relationship between the

selected predictor variables for all candidates taking the Certified Public Accountants Exam.

2. There is a significant relationship between the selected predictor variables for males and success on the Certified Public Accountants Exam.
3. There is a significant relationship between the selected predictor variables for females and success on the Certified Public Accountants exam.
4. There is a significant difference between the predictors of success for all candidates taking the exam and the predictors of success for males and females taking the Certified Public Accountants Exam.

Population and Sample

The population consisted of all candidates who sat for the Uniform CPA Exam in Tennessee during May of 1994 and successfully completed a formal CPA review course. The identity of the population was available from the National Association of State Boards of Accountancy. A questionnaire was mailed to this population of 486 candidates. Because the first mailing did not produce a sufficiently large response, a second mailing was sent to encourage participation.

Instrumentation

Appendix A shows the candidate letter and questionnaire. Because this questionnaire used only objective data from the candidates it was not necessary to test the reliability or validity of the instrument.

Criterion and Predictor Variables

The criterion variable in this study was the average score obtained by the candidate on the four parts of the CPA exam. The four parts of the exam are Accounting and Reporting (AR), Financial Accounting and Reporting (FAR), Auditing (AU), and Law (LAW). While past analysis of the exam gave greater weight to one part of the exam, the new exam format does not weight any part of the exam more than any other. Accordingly, the average score measured is the arithmetic sum of the four parts divided by four.

The predictor, or independent variables, for each of these exam parts are the candidate's race, undergraduate grade point average, college admissions test score, type of college degree, experience in accounting, and age.

Statistical Analysis

Descriptive Statistics

Internal data types were first evaluated by using such univariate statistical indicators as mean, median, mode, standard deviation and range. These techniques provided information about outliers, variance and central tendency. These indicators were also useful in testing data for extreme values such as negative age, a GPA more than four or an ACT score more than 33. Simple linear regressions were developed for each independent variable. The output from these regressions were used to plot scatter diagrams for each variable which allowed the researcher to see the relationship between the variables. Scatter diagrams are also useful in identifying outliers that may compromise the results.

Statistics Used to Show Relationships

To measure the extent of the relationship between the criterion and predictor variables, correlation coefficients were used. Hanke and Reitsch (1994), describe correlation coefficients (usually represented by the letter r) as a value between -1 and +1 that shows the strength of the linear relationship. When r is equal to +1 then 100% of the changes

in the criterion variable are explained by the predictor variables. Another way of saying this is that when r equals +1 the use of the predictor variable will give a 100% better prediction of the criterion variable than using a simple average of past values. When r equals zero, no relationship is found between the two variables. When the correlation coefficient exhibits a negative value, the meaning is the same as a positive value except that an inverse, rather than direct, relationship exists. Squaring the correlation coefficient results in the coefficient of determination (r^2). Hanke and Reitsch (1994, p. 579) say that this r^2 measures the percentage of the variability in the criterion variable explained by the predictor variable.

It was also necessary to determine if the sample results could be assumed to hold for the entire population. Recall that the first three null hypotheses say that no relationship exists between the criterion and predictor variables. To test this hypothesis, it is appropriate to use the test statistic with n-2 degrees of freedom. In this study, a .05 significance level was used. When the calculated t-statistic was greater than the critical value for the test at the .05 level, then the null hypothesis was rejected and a relationship was assumed to exist. If the calculated t-

statistic was smaller than the critical value the null hypothesis was not rejected.

A measure of variability around the sample regression line is the standard error of the estimate. In multiple regression, the standard error of the estimate measures the variability, or scatter, of the observed sample *y* values around the regression plane.

Multiple regressions are used to examine the correlation between the dependant variables and the independent variables. According to Hair, et al. (1992), regression analysis is the most widely used and versatile dependence technique applicable to business decision making. The objective of multiple regression analysis is to use predictor variables with known values to predict a criterion variable. Because the variables are weighted, their relative contribution to the prediction can be determined.

The first step required in multiple regression is to identify the relationships that exist between the criterion and predictor variables and the relationships that exist between the predictor variables. This was done with a correlation matrix that displayed the correlation coefficients for every possible pair of variables in the analysis. Since there are six predictor variables for each of the three

criterion variables, it was necessary to develop three, seven by seven matrices.

The correlation matrices determined if multicollinearity existed. Multicollinearity exists when the predictor variables are too highly correlated among themselves (Hanke & Reitsch, 1994). For example, some researchers have found intercorrelation between age and experience. This was also found in this study; so it was necessary to remove the variable with the least predictive ability. Another reason it is important to try to eliminate multicollinearity is that each of the predictor variables should explain a different part of the criterion variable.

Several factors in multiple regression are similar to simple regression. For example, an *F* value is used to test the null hypothesis that the sample regression equation does not explain a significant percent of the criterion variable. Like the *t*-statistic, the computed *F* value is compared to the critical *F* value and if larger, the null hypothesis is rejected.

The Prediction Models

This study used four regression models. The first model determineed predictor variables for all candidates while the

the partial F value for the original variable in the model to see if it still makes a significant contribution, giventhe presence of the new predictor variable.

4. Repeat this procedure for all predictors not in the model to decide whether one should be included in the model.

5. If a new predictor is included, examine all previous predictors used in the model to judge whether they should be kept.

Hair, et al. (1992) warn that a potential bias in this procedure comes from considering only one variable at a time. If two variables are jointly significant but not individually so, they will not be considered for inclusion.

Differential Predictability Analysis

The test to determine the similarity of the two regression equations is similar to that developed by Messmer and Solomon (1979). Using previous work done by Snedecor and Cochran (1967), Messmer and Solomon said that equations may differ on the basis of residual variance, elevation, or slope. The procedure to be followed is, therefore, to first determine the homogeneity of variance. This is accomplished by completing an analysis of variance of the four selection models, and then conducting a two-tailed F test using the ratio of the male residual mean square to the female residual

mean square. This procedure requires that if the models are not homogeneous the male and female models must be appropriately weighted to remove the effect of this heterogeneity. According to Messmer and Solomon (1979), this weighting can be done by estimating the standard deviation of the residual error in the overall model and the standard deviations corresponding to the residual variances around the regression lines or planes for the male and female groups. This estimate can be obtained from the residual root mean square errors of the corresponding models.

Differences in the slopes of the two regressions involve an analysis of the dummy variable model. Messmer and Solomon (1979) believe this is best done with a one-tailed F test. They state that:

> One effect on the residual variance of the DV [Dummy Variable] model is that a portion of the residual variance can be explained by separate regression lines or planes for males and females. Logically, as the two slopes become increasingly different, the portion of the residual variance accounted for by the separate lines also increases. Further the variance formed by pooling the residual sums of squares from the two separate regression lines or planes is an estimate of the residual variance assuming differences in the two models. Hence, the ratio of that portion of the residual variance in the DV model accounted for by differences in the slopes of the two regressions to the pooled residual variance around the separate regression lines or planes is a one-tailed F test.

Using the data computed in the analysis of variance for the weighted models, this F test can be calculated by first subtracting the residual sum of squares for the male and female model from the dummy variable model as follows:

$$SSE_{Difference\ (slope)} = SSE_{Dummy\ Variable} - (SSE_{Male} + SSE_{Female})$$

This difference is then divided by the difference between the degrees of freedom of the dummy variable model and the degrees of freedom of the male and female model:

$$MSE_{Difference} = SSE_{Difference} / (df_{Dummy\ Variable} - df_{Male} - df_{Female})$$

The pooled mean square error is then calculated as:

$$MSE_{Pooled} = (SSE_{Male} + SSE_{Female}) / (df_{Male} + df_{Female})$$

Finally, the F statistic is calculated as:

$$F = MSE_{Difference} / MSE_{Pooled}$$

If the test is significant at the .05 level, the first null hypothesis is rejected and differential prediction is presumed to be present. In that case, it is necessary to use two separate equations (one for male and one for female) to predict success on the exam. If the test is not significant at the .05, level the null hypothesis is not rejected and a test of the intercept is conducted.

To test the intercept, consider that the relationship in a standard regression is:

$$Y_i = a_i + bX_i$$

therefore:

$$a_1 = Y_1 - bX_1 \text{ (Female Intercept Term)}$$

$$a_2 = Y_2 - bX_2 \text{ (Male Intercept Term)}$$

where "a" is the intercept and "b" is the slope. Recall also that if this test is being conducted, the data has been weighted to achieve homogeneity (if necessary) and the hypothesis of equal slope has failed to be rejected. Therefore, Messmer and Solomon conclude that any difference in intercept can be measured as a two-tailed test of the difference between the two means and calculated as follows.

$$SSE_{Difference(Intercept)} = SSE_{Overall} - SSE_{Dummy\ Variable}$$

After these tests are run, an analysis is made to determine if the combined model can be accepted. Messmer and Solomon do not believe that heterogeneity is sufficient justification to use two separate models. On the other hand, they believe that if the tests cause rejection of the fourth null hypothesis regarding slope or elevation, then the two regression lines are assumed to be different and separate models must be used.

PROTECTION OF HUMAN RIGHTS

Participants in this study were not exposed to any risks, discomforts, or violation of human rights. All subjects

participated voluntarily and were not identified in any way. Each participant's file was assigned a code and only the primary investigator had access to names. All data was reported in group format and was made available to participants if requested.

CHAPTER IV

ANALYSIS AND PRESENTATION OF FINDINGS

This chapter analyzes and presents the findings of the research. The purpose of the study was to examine the relationship between selected variables and success on the Uniform Certified Public Accountants Examination, and to determine if differential predictability exists between the variables that predict success for males and the variables that predict success for females.

By means of a survey instrument, data were collected from the records of select Tennessee candidates who sat for the exam in May of 1994 and received grades in August of the same year. Only candidates who completed a formal CPA review course before sitting for the exam were considered. Candidate scores were examined for each of the four parts of the exam, and an average was taken for the four grades received.

The findings of the study regarding the degree of correlation of the selected independent variables with achievement on the exam and the presence of differential

predictability are presented in the following order. First, charts are used to illustrate the data obtained from the questionnaires. Next, cross tabulations of the variable sex against other variables are developed to examine the differences between male and female respondents. These cross tabulations are then repeated for only the successful candidates to make an initial determination of predictive ability.

The third part of the study develops a test of symmetry of the normal distribution to find out if parametric statistics are appropriate with this data. In the last section, each of the research questions is stated and correlation coefficients and descriptive statistics for each of the predictor variables are presented. The variables are then subjected to stepwise regression analysis using the major predictor variables. Finally, through analysis of variance and other tests of slope and intercept, the presence or absence of differential predictability is determined.

Demographic and Descriptive Data

The population of this study consisted of all candidates who sat for the May 1994 CPA examination after completing a formal CPA review course of at least 100 hours duration. Data

were obtained by use of a questionnaire mailed directly to a random sample of the population. The population was identified through mailing labels provided by the National Association of State Boards of Accountancy.

Random numbers were assigned to all questionnaires and data were entered into a computer data base and sorted by the variables sex, age, amount and type of experience, race, level and type of education, undergraduate grade point average, and ACT score. Those students reporting an SAT score had that score adjusted to the equivalent ACT mark. Each file also included the candidates score on each of the four parts of the exam and an average score for all parts of the exam. A variable code list is included in Appendix B.

The first mailing of the questionnaire occurred in early November, 1994, and a second mailing was sent to nonrespondents in December of 1994. A total of 486 questionnaires was sent in the first mailing and 371 in the second mailing. From these mailings, 115 or 23.66% were received from the first mailing and 53 or 14.29% were received from the second mailing for a total response of 34.57%. Of the total 168 responses, 103 were complete and usable, 33 had incomplete but usable information, 20 had incomplete information that was completed through a variety of other

means and 12 were returned blank.

Figure 1 illustrates the numbers and the percentages of those candidates in the sample that passed the various parts of the exam. Of the 156 respondents reporting a score, it can be seen that less than 20% of all candidates passed three or more parts of the exam. Almost a fourth passed two parts and slightly over a third passed one part. Nearly one-fourth passed no parts at all.

The sample population had an average score of 70.53 on the auditing portion of the exam, 69.85 on the law portion, 69.24 on the Accounting and Reporting portion, and 68.38 on the Financial and Reporting section. The sample had a combined four part score of 69.61%. This average score for each part was slightly higher than the State of Tennessee or the United States as a whole. This is probably because the sample included only those candidates who had taken a formal review course in preparation for the exam.

Figures two through eight on the following pages illustrate the age, gender, race, professional experience, highest degree, ACT scores, and grade point average of the respondents to the questionnaires. The charts also show the number of candidates responding to the particular question and the number of candidates who failed to respond.

Figure 1

Number of Parts Passed for Study Participants

N = 156

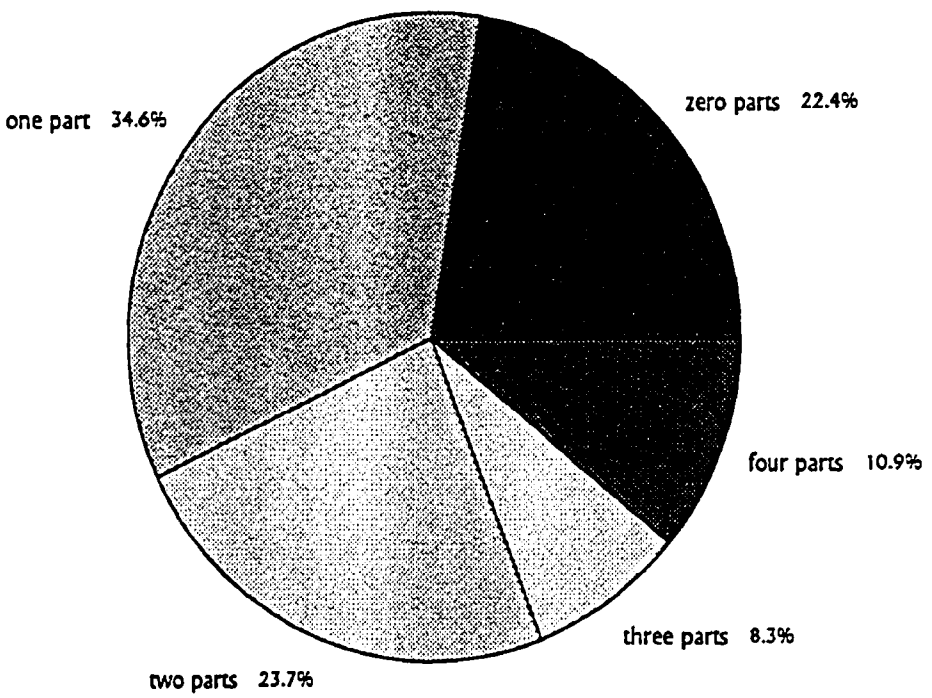
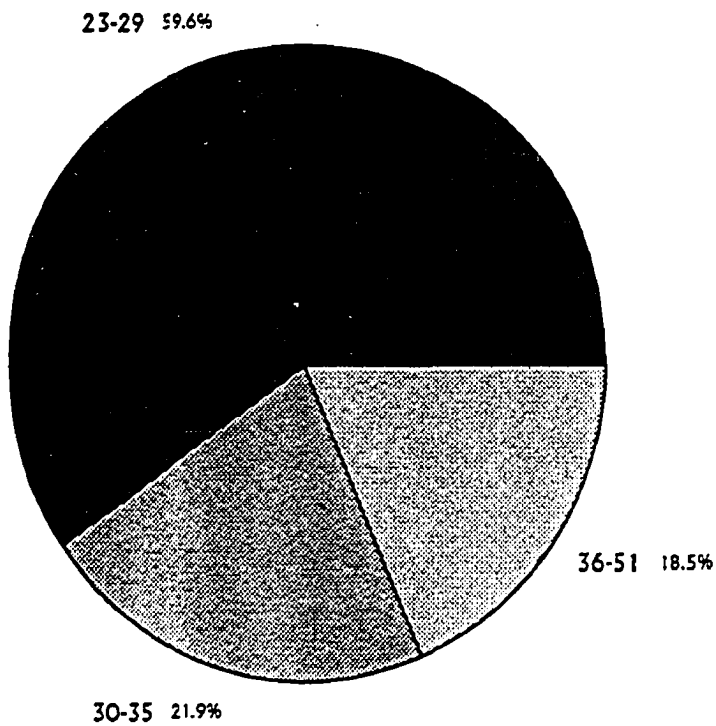


Figure 2

Age of Study Participants

N = 146

Note: 10 respondents did not answer this question

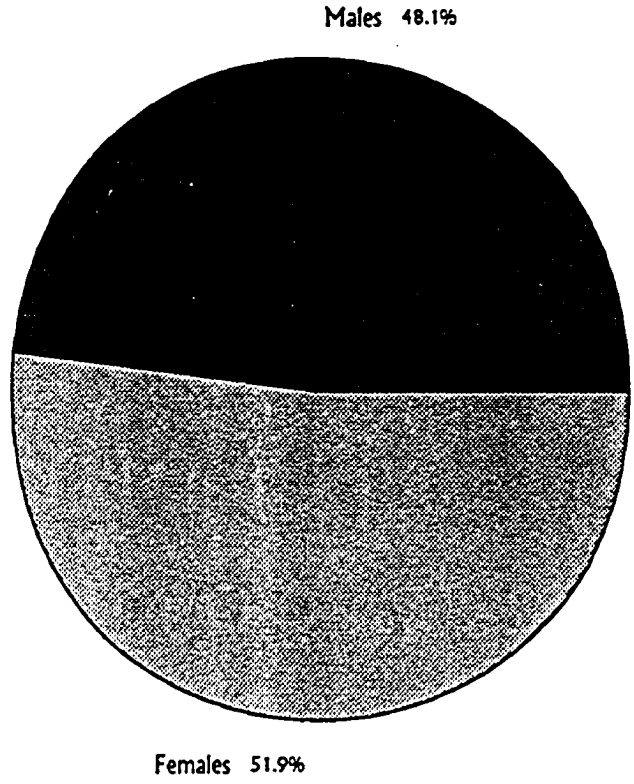


Students ranged in age from a low of 23 to a high of 51 with a median age of 30.226. The age of the participants was slightly more than the age of the general population of exam candidates over the last three exams. The large number of candidates in the 20 to 30 ranges reflects the encouragement many students receive to take the exam at the earliest date possible.

Figure 3

Gender of Study Participants

N =156



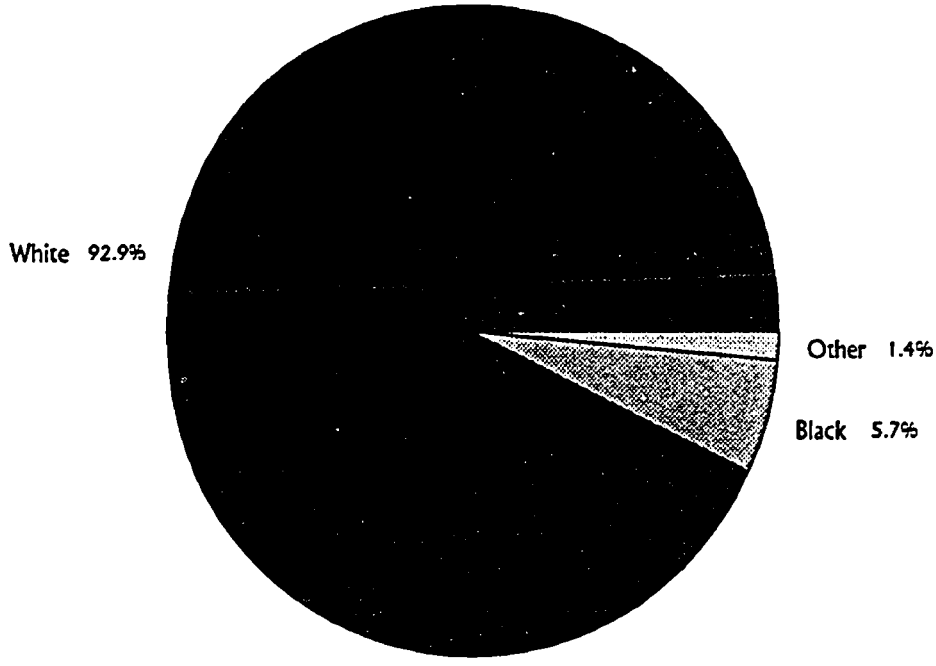
Reflecting recent trends in the gender makeup of the exam, slightly over half of the respondents were identified as female. This is a relatively recent phenomenon in accounting but is consistent with national trends that show more female candidates than males.

Figure 4

Race of Study Participants

N = 140

Note: 16 respondents did not answer this question



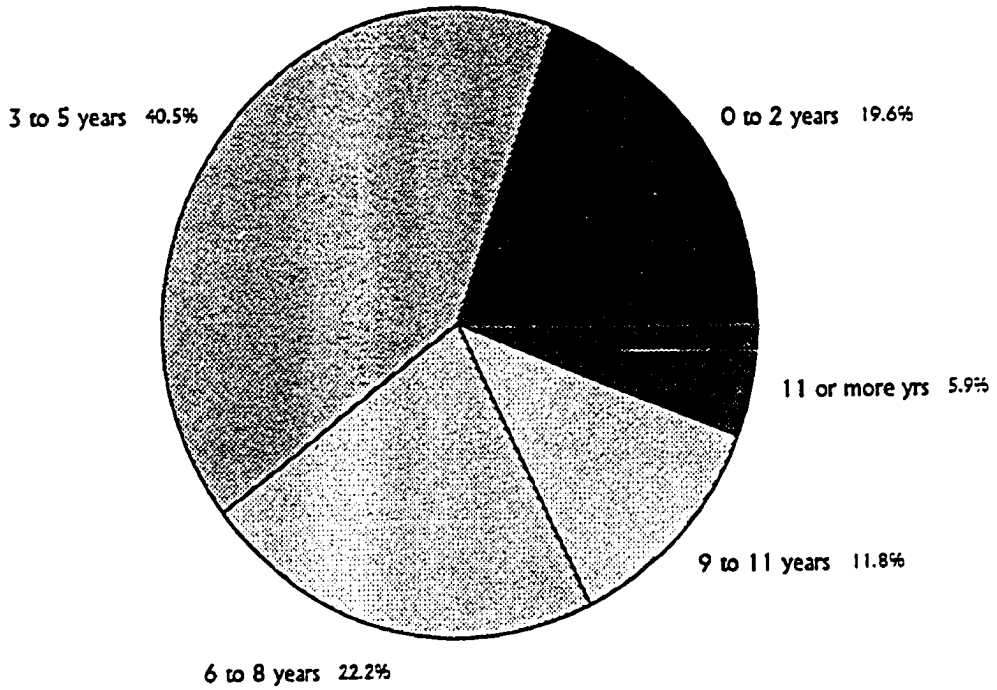
The original intent of the research was to find out the effect of race on the prediction model. However, race was not used as a predictor because the number of minorities taking the exam continues to be small. In this study, they represented only 7.14% of the sample. This was not unexpected in that only 1% of all CPA's nationally are minorities. Accordingly, accounting has the smallest percentage of minorities of all major professions.

Figure 5

Professional Experience of Study Participants

N = 153

Note: Three respondents did not answer this question.

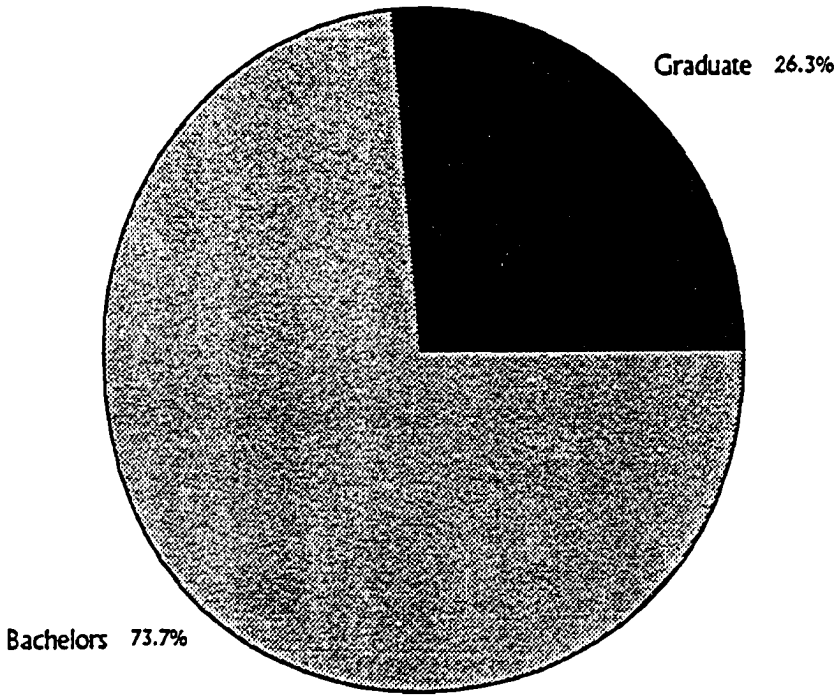


Respondents to this survey reported between zero and 20 years of experience with a mean of 5.609 years and a standard deviation of 3.634 years. Previous research has had conflicting results regarding experience. Some researchers have found some type of experience to be of benefit in taking the exam. Other researchers have found that, with increasing time since formal education, experience has been a negative predictor of success.

Figure 6

Highest Degree of Study Participants

N = 156



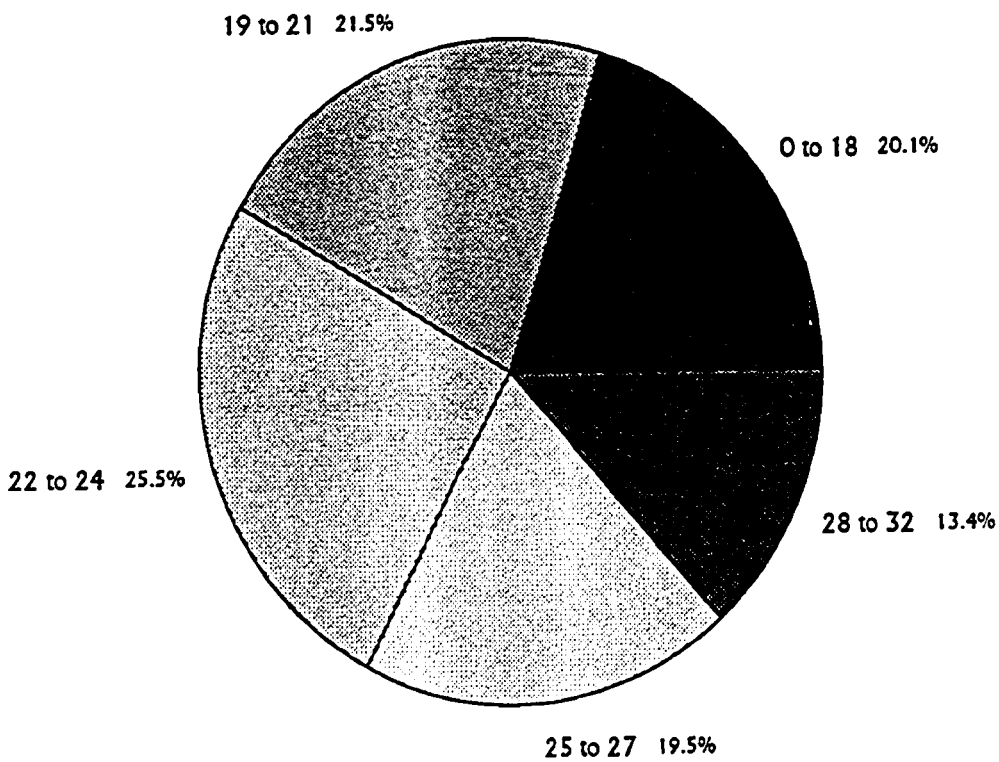
A major justification for the 150-Hour requirement is that those candidates with more education will perform better on the CPA exam. Participants in this study were more likely to have a higher level of education because of the 150-Hour law in existence in Tennessee.

Figure 7

ACT Scores of Study Participants

N = 149

Note: Seven respondents did not answer this question.



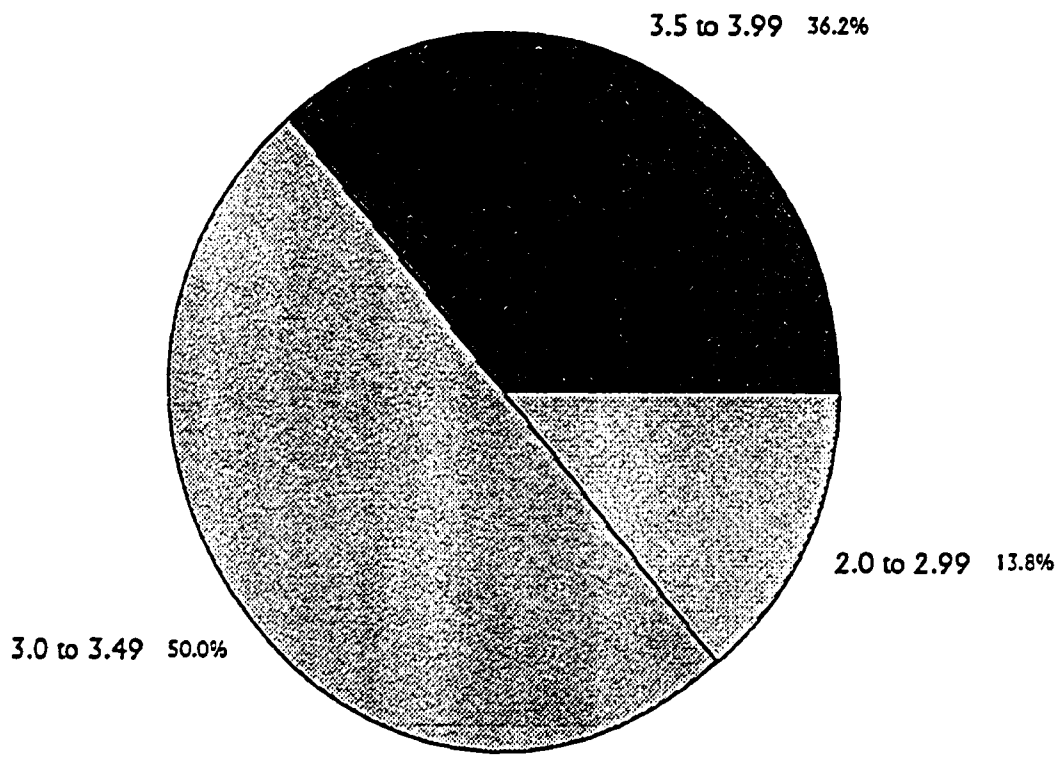
The two most common predictors of success on the CPA examination in previous research have been the student's UGPA and scores on college entrance exams. Respondents in this study had an average ACT score of 22.188 with a standard deviation of 4.386.

Figure 8

Grade Point Average of Study Participants

N = 149

Note: Seven respondents did not answer this question.



Undergraduate grade point average (UGPA) has been shown to be an excellent predictor for success on many types of exams. Respondents to this survey had a UGPA of 3.194 with a standard deviation of 0.417.

Cross Tabulation of Data

Table 1 illustrates a cross tabulation of sex by race for the 140 respondents who identified their race. This table shows that the 130 white candidates were split exactly at 50% male and 50% female. Of the eight black candidates, six were female and two were male. It can be seen that black males comprise an almost negligible number of responses from the population. None of the respondents identified their race as oriental or Hispanic and only two respondents listed their race as "other." Of the two listed as "other," both were female.

Table 2 shows a similar cross tabulation for those candidates who passed two or more parts of the exam. These figures show that the white female candidates had a 42% success rate, white males had a 38% success rate, black females had a 17% pass rate and black males had a 50% pass rate. As can be seen, however, the numbers of minorities are so small as to make any comparisons meaningless.

Table 3 shows a cross tabulation of sex by undergraduate grade point average (UGPA) for all respondents. While no candidate reported a UGPA of 4.0, it can be seen from Table 3 that 25 female and 11 male candidates had a UGPA of 3.5 to 3.99, 41 female and 37 male candidates reported a grade point

TABLE 1

A Cross Tabulation of Race by Sex of
All Study Participants

RACE	FEMALE	MALE	TOTAL
White	65 (89.04%)	65 (97.01%)	130 (92.85%)
Black	6 (8.21%)	2 (2.99%)	8 (5.71%)
Oriental	-0-	-0-	-0-
Hispanic	-0-	-0-	-0-
Other	2 (2.73%)	-0-	2 (1.42%)
TOTAL	73 (100%)	67 (100%)	140 (100%)

Note: Sixteen respondents did not indicate race.

TABLE 2

A Cross Tabulation of Race by Sex of Successful Study Participants

RACE	FEMALE	MALE	TOTAL
White	27 (41.54%)	25 (38.46%)	52 (40.00%)
Black	1 (16.67%)	1 (50.00%)	2 (25.00%)
Oriental	-0-	-0-	-0-
Hispanic	-0-	-0-	-0-
Other	1 (50.00%)	-0-	1 (50.00%)
TOTAL	29 (39.73%)	26 (38.81%)	55 (39.29%)

Note: Five of the successful respondents did not indicate race.

Percentages represent the number of successful candidates as a percentage of total candidates in each bracket.

average of 3.0 to 3.49 and 12 female and 23 male candidates had a UGPA of 2.0 to 2.99. An analysis of this tables shows that females generally reported higher UGPA's than males.

Table 4 shows a cross tabulation of sex by UGPA for all respondents who achieved an average score of 75 or more on the exam and reported a UGPA. The table suggests a strong correlation between UGPA and success on the exam. An examination of the table shows 56% of females and 63% of males with a UGPA of 3.5 to 3.99 were successful on the exam. This compares to only a 16.67% pass rate for females with less than a 3.0 average and a 26.09% pass rate for males with a UGPA below 3.0. Respondent- with a grade point average of 3.0 to 3.5 had success rates about midway between these two extremes. While not shown in the table, only two of the male respondents with a UGPA of 2.0 to 2.49 were successful and none of the female candidates with a UGPA, of 2.0 to 2.49 were successful.

A cross tabulation of sex by highest level of education for all respondents is presented in Table 5. This figure reveals that of the 81 female respondents, 64 had only a baccalaureate degree, while 17 had a graduate degree. It can be seen that males were more likely to possess a graduate degree than females.

TABLE 3

A Cross Tabulation of Sex by Undergraduate Grade Point Average of All Study Participants

UGPA	FEMALE	MALE	TOTAL
4.0	-0-	-0-	-0-
3.5-3.99	25 (32.05%)	11 (15.49%)	36 (24.16%)
3.0-3.49	41 (52.56%)	37 (52.11%)	78 (52.35%)
2.0-2.99	12 (15.38%)	23 (32.39%)	35 (23.49%)
TOTAL	78 (100%)	71 (100%)	149 (100%)

Note: Four male and three female respondents failed to provide their UGPA.

TABLE 4

A Cross Tabulation of Sex by Undergraduate Grade Point Average of Successful Study Participants

UGPA	FEMALE	MALE	TOTAL
4.0	-0-	-0-	-0-
3.5-3.99	14 (56.00%)	7 (63.64%)	21 (58.33%)
3.0-3.49	15 (36.59%)	14 (37.84%)	29 (37.18%)
2.0-2.99	2 (16.67%)	6 (26.09%)	8 (22.86%)
TOTAL	31 (39.74%)	27 (38.03%)	58 (38.93%)

Note: One of the successful female respondents and one of the successful male respondents did not give their grade point average.

Percentages represent the number of successful candidates as a percentage of total candidates in each bracket.

A cross tabulation of sex by highest level of education for successful respondents is presented in Table 6. A review of this table seems to suggest that candidates with a post graduate degree have greater success on the exam. Females with a graduate degree passed the exam 47% of the time while females without the graduate degree passed only 37% of the time. The spread among males was even greater. Males with graduate degrees passed 54% of the time while those with only a bachelors degree passed only 29.14% of the time.

Previous research regarding the effect of education and success has had mixed results with some researchers finding a relationship and others not being able to do so. In this study, further analysis did not show that the relationship between this variable and success on the CPA exam was significant.

A cross tabulation of sex by years of accounting work experience for all respondents is presented in Table 7. This table shows that women generally had a greater amount of experience than men. For example, over 31% of all male candidates had between zero and two years of experience, while there were less than 9% of female candidates with such a small amount of experience.

TABLE 5

A Cross Tabulation of Sex by Education of All Study Participants

EDUCATION	FEMALE	MALE	TOTAL
Bachelors	64 (79.01%)	51 (68.00%)	115 (73.72%)
Graduate	17 (20.99%)	24 (32.00%)	41 (26.28%)
TOTAL	81 (100%)	75 (100%)	156 (100%)

TABLE 6

A Cross Tabulation of Sex by Education of Successful Study Participants

EDUCATION	FEMALE	MALE	TOTAL
Bachelors	24 (37.50%)	15 (29.41%)	39 (33.91%)
Masters	8 (47.06%)	13 (54.17%)	22 (53.66%)
TOTAL	32 (39.51%)	28 (37.33%)	60 (38.71%)

Percentages represent the number of successful candidates as percentage of total candidates in each bracket.

TABLE 7

A Cross Tabulation of Sex by Accounting Experience of All Study Participants

EXPERIENCE	FEMALE	MALE	TOTAL
0-2 years	7 (08.75%)	23 (31.51%)	30 (19.61%)
3-5 years	36 (45.00%)	26 (35.62%)	62 (40.52%)
6-8 years	24 (30.00%)	10 (13.70%)	34 (22.22%)
9-11 years	9 (11.25%)	9 (12.33%)	18 (11.76%)
>11 years	4 (5.00%)	5 (6.85%)	9 (5.88%)
TOTAL	80 (100%)	73 (100%)	153 (100%)

Note: Three respondents failed to list the amount of their experience.

A cross tabulation of sex by years of accounting work experience for all successful candidates is shown in Table 8. This table appears to demonstrate a relationship between accounting work experience and success especially for female candidates. An examination of the table reveals that females with two or fewer years of experience are successful only 14.29% of the time while candidates with 3-5 years experience are successful about one-third of the time. Female candidates with more than five years experience are successful almost one half of the time.

This relationship does not appear as pronounced for male candidates. Even so, the table shows that male candidates with five years or less experience are successful less than 30% of the time while male candidates with more than five years experience are successful more than half of the time. Later analysis confirmed that there is a significant relationship between professional experience and success on the CPA exam for women but not for men.

A cross tabulation of sex by age for all respondents is presented in Table 9. This table reveals that almost 60% of CPA candidates take the exam before age 30. The youngest person in this survey to take the exam was 23 years old. This is a higher age than might be found in prior exams because

TABLE 8

A Cross Tabulation of Sex by Accounting Experience of Successful Study Participants

EXPERIENCE	FEMALE	MALE	TOTAL
0-2 years	1 (14.29%)	7 (30.43%)	8 (26.67%)
3-5 years	13 (36.11%)	7 (26.92%)	20 (32.25%)
6-8 years	12 (50.00%)	5 (50.00%)	17 (50.00%)
9-11 years	4 (44.44%)	6 (66.67%)	10 (55.56%)
>11 years	2 (50.00%)	3 (60.00%)	5 (55.56%)
TOTAL	32 (40.00%)	28 (38.36%)	60 (39.22%)

Note: All successful candidates listed their accounting work experience.

Percentages represent the number of successful candidates as a percentage to total candidates in each bracket.

TABLE 9

A Cross Tabulation of Sex by Age of
All Study Participants

AGE	FEMALE	MALE	TOTAL
23-29	46 (58.97%)	41 (60.29%)	87 (59.59%)
30-35	16 (20.51%)	16 (23.53%)	32 (21.92%)
36-51	16 (20.51%)	11 (16.17%)	27 (18.49%)
TOTAL	78 (100%)	68 (100%)	146 (100%)

Note: Ten respondents did not give their age.

TABLE 10

A Cross Tabulation of Sex by Age of Successful Study Participants

AGE	FEMALE	MALE	TOTAL
23-29	19 (41.30%)	11 (26.83%)	30 (34.48%)
30-35	5 (31.25%)	11 (68.75%)	16 (50.00%)
36-51	8 (50.00%)	5 (45.45%)	13 (48.15%)
TOTAL	32 (41.02%)	27 (39.71%)	59 (40.41%)

Note: Seven successful male respondents and 13 successful female respondents did not list their age.

Percentages represent the number of successful candidates as a percentage of total candidates in each bracket.

the only people eligible to take the exam were those who had taken it in the past or those who had completed 150 semester hours of work before applying for the exam. It would be difficult for anyone to complete this requirement at a younger age. The oldest person in the study to sit was 51 years old. The table does not reveal any clear trends in terms of males or females taking the exam at any particular age. Apparently, men and women take the exam at approximately the same ages.

A cross tabulation of sex by age for all successful respondents is presented in Table 9. This table does not reveal any clear pattern of success. For example, 34% of candidates under age 30 were successful and 48% over 35 were successful. However, those in the 30 to 35 age bracket were 50% successful. The cause of this initial decline in success and then subsequent rise is not immediately evident.

A review of the success rates for males and females also fails to suggest a pattern. Apparently, the effect of age for both males and females is similar.

Table 11 illustrates a cross-tabulation by sex and ACT for all respondents. An analysis of this table shows that female ACT scores tend to be more varied than male scores. Note that male scores tend to cluster in the middle with fewer scores away from the median. Female scores tend to be more

varied with an approximate equal number of scores in each range.

Table 12 illustrates a cross-tabulation by sex and ACT for all successful respondents. An analysis of this table shows that none of the male or female candidates with an ACT score of 18 or below passed the CPA exam. The table further shows that the percent passing increases in every category for both males and females as the ACT score goes up. This can be seen clearly in the total column, which shows that 31% of the candidates with a score of 19 to 21 were successful on the exam, 39% of those with a score of 22 to 24 were successful, 62% of those with a score of 25 to 27 were successful, and 75% of the group with the highest ACT scores were successful.

TABLE 11

A Cross Tabulation of Sex by ACT Score of All Study Participants

ACT	FEMALE	MALE	TOTAL
0-18	18 (23.08%)	12 (16.90%)	30 (20.13%)
19-21	15 (19.23%)	17 (23.94%)	32 (21.48%)
22-24	17 (21.79%)	21 (29.58%)	38 (25.50%)
25-27	16 (20.51%)	13 (18.31%)	29 (19.46%)
28-32	12 (15.38%)	8 (11.27%)	20 (13.32%)
TOTAL	78 (100%)	71 (100%)	149 (100%)

Note: Four male respondents and three female respondents did not provide their ACT or SAT score.

Percentages in parentheses is the percent of candidates in that bracket to total candidates.

TABLE 12

A Cross Tabulation of Sex by ACT Score of Successful Study Participants

ACT	FEMALE	MALE	TOTAL
12-18	-0-	-0-	-0-
19-21	6 (40.00%)	4 (23.53%)	10 (31.25%)
22-24	8 (47.05%)	7 (33.33%)	15 (39.47%)
25-27	9 (56.25%)	9 (69.23%)	18 (62.06%)
28-32	8 (66.67)	7 (87.50%)	15 (75.00%)
TOTAL	29 (37.18%)	23 (32.39%)	52 (34.90%)

Note: One successful male respondent and one successful female respondent did not provide an ACT or SAT score.

Percentages represent the number of successful candidates as a percentage of total candidates in each bracket.

Test of Symmetry of the Normal Distribution

To determine the appropriateness of the use of parametric statistics, it was necessary to determine the symmetry of the mean, median, and mode. In a skewed distribution, the mean moves away from the mode toward the extreme values. While not affected as much as the mean, the median is also pulled away from the mode. In this study, the test for normality was accomplished by dividing the skewness of the variable by the standard error of the skew, which was obtained from the frequency distribution of all variables. If the calculated value exceeds a critical value, then the distribution is non-normal. In this study, a calculated value exceeding a plus or minus 2.58 would indicate that an assumption of a normal distribution would be rejected at the .01 probability level and parametric statistics would be inappropriate.

Table 13 summarizes the results of tests of the variables in this study. While race, age, UGPA and type of degree do not appear to be normally distributed, average score on the exam, professional work experience, ACT score, and sex, are normally distributed. Therefore, parametric statistics are appropriate to this study.

Table 13

Skewness Data From Frequency Distribution

VARIABLE	SKEWNESS	S.E. SKEW	Z-VALUE	RESULTS
Avg. Score	-.531	.211	-2.517	N
Sex	.078	.194	0.4020	N
Race	5.341	.205	26.054	S
Age	1.291	.201	6.423	S
Education	1.088	.194	5.608	S
ACT	-0.031	.199	-0.156	N
UGPA	-1.021	.199	-5.131	S
Experience	.414	.194	2.134	N

*S - Skewed
N - Normal Distribution

If Z Value is => 2.58 then the assumption of a normal distribution is rejected at the .01 probability level.

FINDINGS

This section addresses the statistical output for each of the research questions in the study. Each research question is stated and a narrative with supporting table(s) is provided.

Research Question Number One

What are the variables that predict success for all candidates taking the Uniform Certified Public Accountants Examination?

The relationship between each of the predictor variables and the criterion variable (average score on the CPA examination) was examined to determine the appropriate combinations. The descriptive data provided earlier in this chapter showed a very small number of non-white candidates causing this researcher to drop this variable as a predictor. Table 14 illustrates the correlations that were developed between the remaining variables of age, UGPA, ACT, accounting experience, and level of education with the criterion variable of average score on the CPA exam.

The two values in each category of Table 14 represent the correlation coefficient and a P value that is used to test

Table 14
Simple Correlation Coefficients

N = 132

Predictor Variable	Average Score
Age	0.05660
P	0.25960
GPA	0.21396
P	0.00688
ACT	0.67080
P	0.00000
Exp	0.22005
P	0.00562
Educ	0.14517
P	0.04838

whether the coefficient is significantly different from zero. The number of matched pairs used to calculate the correlation coefficient was 132.

The r values between average score on the exam and ACT showed the highest level of correlation of any of the matched pairs with an r of 0.6708. The predictor variables undergraduate GPA, Education, and Experience had an r that ranged from 0.22005 to 0.14517. These r's were significant at the .05 level.

The predictor variable Age failed to correlate with the criterion variable at the .05 level of significance. While some past studies found a negative correlation with age, no negative correlations were identified in this study between the criterion variable and any of the predictor variables.

Based on the above, four of the five predictor variables exhibit a relationship with the criterion variable. The variable age, however, does not appear to correlate with the success on the exam.

Descriptive statistics are presented in Appendix C. This appendix provides several general statistics related to the various predictor models. For example, a review of Appendix C gives means, medians, modes and such other data as kurtosis and skewness.

Table 16 shows the correlation coefficients calculated for the regression model. A review of Table 16 reveals high correlation between UGPA and ACT score, UGPA and age, and professional experience and age. The correlation between GPA and ACT and the correlation between experience and age was expected, but the negative correlation between UGPA and age was not expected. This could reflect nothing more than grade inflation or it could indicate that students with lower UGPA's tend to wait longer to sit for the exam. Low correlations exist between the variables education and UGPA, experience and UGPA, education and ACT, experience and ACT, age and ACT, experience and education, and age and education.

A foreword stepwise regression was conducted to identify those variables that accounted for the maximum variance in the dependant variable. Because of the high correlation between UGPA and ACT, and because ACT has the highest correlation with average score, UGPA was removed as a predictor variable. Because of the high correlation between age and experience, and because experience has the higher correlation of the two, age was also removed as a predictor. The final predictor variables used in the foreword stepwise regression were, therefore, ACT, education, and experience.

Table 15

Correlation Coefficients for All Variables and All Candidates

	AGE	EDUC	EXP	ACT	UGPA
AGE	1.0000				
P					
EDUC	0.1282	1.0000			
P	0.0715				
EXP	0.6763	0.0946	1.0000		
P	0.0000	0.1403			
ACT	0.0666	0.0986	-0.0164	1.0000	
P	0.2239	0.1303	0.4257		
UGPA	-0.2087	0.0380	-0.1100	0.3089	1.0000
P	0.0082	0.3327	0.1047	0.0002	

The regression analysis provides a variety of information. In a simple regression, an r^2 measures the proportion of variation in the criterion variable explained by the regression equation. A similar measure, the coefficient of multiple determination or R^2, quantifies the degree of association when more than two variables are present. Therefore, the R^2 measures the proportion of variation in the criterion variable explained by the multiple regression equation. The regression analysis also yields the multiple-correlation coefficient, R and an adjusted R^2. This adjusted R^2 statistic is adjusted for the number of independent variables in the equation and is calculated as the change in R^2 value when compared to the previous variable. An adjusted R^2 is considered a more conservative estimate of the percent of variance explained. This is especially important for a small sample size.

The results of the stepwise regression are shown in Table 17. The ACT was the first variable to enter ($F_{(1,147)}$ = 109.42638, $p < 0.0001$) and explained 42.284 percent of the variance ($r^2_{Adjusted}$ = .42284). The second variable to enter was experience ($F_{(2,146)}$ = 63.86786, $p <.00001$) and explained 45.933 percent of the variance ($r^2_{Adjusted}$ = 0.45933). No other variables entered the equation. We, therefore, reject the

null hypothesis that there is no significant relationship between any of the selected predictor variables for all candidates and success on the Certified Public Accountants exam in stating that the candidate's ACT score and their professional work experience do predict success on the exam. It can be seen from these results that the variables that best predict success on the CPA exam for all candidates are ACT and experience. The resulting model obtained is:

$$Ave.\ Score = 45.1707 + 104301\ (ACT) + 0.39037\ (EXP) \pm 10.2543$$

Table 16

STEPWISE REGRESSION OF AVERAGE SCORE FOR ALL CANDIDATES
ONTO PREDICTOR VARIABLES
ACT, EDUCATION AND EXPERIENCE

STEP 1

Multiple R	0.65325
R Square	0.42674
Adjusted R Square	0.42284
Standard Error	5.29734

VARIABLES IN THE EQUATION

Variable	B	SE B	Beta	T	Sig T
ACT	1.038593	0.096285	.653250	10.461	.0000
Constant	47.529604	2.245271		21.169	.0000

VARIABLES NOT IN THE EQUATION

Variable	Beta In	Partial	Min Toler	T	Sig T
EDU	.075785	.099533	.988845	1.209	.2287
EXP	.199776	.263830	.999807	3.305	.0012

Table 16 (Continued)

STEPWISE REGRESSION OF AVERAGE SCORE ONTO
PREDICTOR VARIABLES
ACT, EDUCATION AND EXPERIENCE

STEP 2

Multiple R	0.68311
R Square	0.46664
Adjusted R Square	0.45933
Standard Error	5.12712

VARIABLES IN THE EQUATION

Variable	B	SE B	Beta	T	Sig T
ACT	1.043005	0.096104	.656025	10.853	.0000
EXP	.390373	0.118117	.199776	3.305	.0012
Constant	45.170692	2.287335		19.748	.0000

VARIABLES NOT IN THE EQUATION

Variable	Beta In	Partial	Min Toler	T	Sig T
EDU	.063417	.086178	.984943	1.042	.2993

Research Question Number Two

What are the variables that predict success for males taking the Uniform Certified Public Accountants Examination?

The procedures used to analyze research question number one were repeated for question number two. The simple correlations between the predictor variables and the criterion variable were reported in Table 14 and descriptive statistics for all male candidates are shown in Appendix D. Appendix D provides a variety of information, but the major significance is how similar the male statistics are to the overall statistics presented in Appendix C. For example, the mean ACT score for men is 22.113 compared to a mean of 22.188 overall. The age of male candidates was 29.824 compared to an overall median age of 30.226. Other comparisons between Appendix C, Appendix D, and Appendix E, which gives the statistics for females, also show the similarities between the two groups.

Table 20 shows the correlation coefficients for the variables age, education, experience, ACT score, and UGPA for all male candidates are shown in Table 20. Table 20 shows that age and experience have the highest correlation of 0.7428. Significant correlations also exist for age and education, age and UGPA, and ACT and UGPA. All these

correlations are significant at the .05 level. As in the combined group, education and experience, age and ACT, education and UGPA, education and ACT, experience and ACT, and experience and UGPA did not significantly correlate.

As in the combined model, the predictors age and UGPA were eliminated because of high correlation. A second foreword stepwise regression was conducted to identify those variables that accounted for the maximum variance in the dependant variable for males. Table 21 shows the results of the stepwise regression for the male candidates. The first variable to enter was ACT ($F_{(1,69)} = 57.94462$, $p < .0001$) and explained 44.858 percent of the variance ($r^2_{Adjusted} = 0.44858$). No other variables entered the equation. In spite of the inclusion of only one variable, it should be noted that ACT was a better predictor of success for males than it was for the combined group, and it was almost as good (.44859 compared to .45933) as was ACT and experience for the combined model.

Based on this regression, we reject the null hypothesis that there is no significant relationship between any of the selected predictor variables for males and success on the Certified Public Accountants exam in saying that the male candidate's ACT score is a predictor of success on the exam.

Table 17

Correlation Coefficients for All Variables and All Male Candidates

	AGE	EDUC	EXP	ACT	UGPA
AGE	1.0000				
P					
EDUC	0.2366	1.0000			
P	0.0321				
EXP	0.7428	0.0649	1.0000		
P	0.0000	0.3082			
ACT	-0.0052	0.1951	-0.0653	1.0000	
P	0.4840	0.0643	0.3071		
UGPA	-0.2389	0.0837	-0.0551	0.3216	1.0000
P	0.0308	0.2589	0.2810	0.0054	

Table 18

STEPWISE REGRESSION OF AVERAGE SCORE FOR MALE CANDIDATES
ONTO PREDICTOR VARIABLES
ACT, EDUCATION AND EXPERIENCE

STEP 1

Multiple R	0.67562
R Square	0.45646
Adjusted R Square	0.44858
Standard Error	5.01356

VARIABLES IN THE EQUATION

Variable	B	SE B	Beta	T	Sig T
ACT	1.135760	0.149204	.675615	7.612	.0000
Constant	45.933483	3.352518		13.701	.0000

VARIABLES NOT IN THE EQUATION

Variable	Beta In	Partial	Min Toler	T	Sig T
EDU	.068831	.091190	.954032	.755	.4528
EXP	.151750	0.205360	.998102	1.733	.0877

This differs from the combined model that included a factor for experience. The resulting model for males is:

$$Score = 45.93348 + 1.13576\ (ACT) \pm 10.02712$$

Research Question Number Three

What are the variables that predict success for females taking the Uniform Certified Public Accountants Examination?

The procedures used to analyze research question number one and two were repeated for question three. The simple correlations between the predictor variables and the criterion variable were reported in Table 14, and the descriptive statistics for all female candidates are shown in Appendix E. As in the previous two questions, the descriptive statistics give a variety of information necessary to fully understand the various predictor variables. The correlation coefficients of the predictor variables are shown in Table 24. This table shows that success on the exam for female candidates is similar to that for males. As expected, the highest correlation (0.6132) exists between age and experience, and ACT and UGPA (0.3286). Again, age and UGPA were dropped as predictor variables. Females did differ from males in the relationship between age and education. For males, as age increases so does education. This relationship is not

indicated for females.

A third foreword stepwise regression was conducted to identify those variables that accounted for the maximum variance in the dependant variable for females. The ACT was the first variable to enter ($F_{(1,76)} = 53.50721$, $p < 0.0001$) and explained 40.544 percent of the variance ($r^2_{Adjusted} = .40544$). The second variable to enter was experience ($F_{(2,76)} = 34.6271$, $p < .00001$) and explained 46.622 percent of the variance ($r^2_{Adjusted} = 0.46622$). No other variables entered the equation. While ACT was not as good a predictor for females as males, the combination of ACT and experience explained a greater percentage of the variance than either the combined or the male model.

Based on the results of the above regression, we reject the null hypothesis that there is no significant relationship between any of the selected predictor variables for females and success on the Certified Public Accountants exam in saying that the candidate's ACT score and their professional work experience do predict success on the exam. These are the same variables that predict success for the combined model. The resulting model is:

$$Score = 44.25447 + 1.00629\ (ACT) + 0.58943\ (EXP) \pm 10.4578$$

Table 19

Correlation Coefficients for All Variables and All Female Candidates

N = 70

	AGE	EDUC	EXP	ACT	UGPA
AGE	1.0000				
P					
EDUC	0.0447	1.0000			
P	0.3566				
EXP	0.6132	0.1502	1.0000		
P	0.0000	0.1073			
ACT	0.1204	0.0174	-0.0871	1.0000	
P	0.1604	0.4433	0.2367		
UGPA	-0.2304	0.0682	-0.1953	0.3286	1.0000
P	0.0385	0.2874	0.0526	0.0027	

Table 20

STEPWISE REGRESSION OF AVERAGE SCORE FOR FEMALE CANDIDATES ONTO PREDICTOR VARIABLES ACT, EDUCATION AND EXPERIENCE

STEP 1

Multiple R	0.64278
R Square	0.41316
Adjusted R Square	0.40544
Standard Error	5.53976

VARIABLES IN THE EQUATION

Variable	B	SE B	Beta	T	Sig T
ACT	.977976	.133697	.642775	7.315	.0000
Constant	48.375822	3.041010		15.908	.0000

VARIABLES NOT IN THE EQUATION

Variable	Beta In	Partial	Min Toler	T	Sig T
EDU	.056581	.073849	.999694	.641	.5233
EXP	.259366	.337701	.994853	3.107	.0027

Table 20 (Continued)

STEPWISE REGRESSION OF AVERAGE SCORE FOR FEMALE CANDIDATES ONTO PREDICTOR VARIABLES ACT, EDUCATION AND EXPERIENCE

STEP 2

Multiple R	0.69288
R Square	0.48008
Adjusted R Square	0.46622
Standard Error	5.24896

VARIABLES IN THE EQUATION

Variable	B	SE B	Beta	T	Sig T
ACT	1.006286	0.127006	.661382	7.923	.0000
EXP	.589434	0.189705	.259366	3.107	.0027
Constant	44.254466	3.172029		13.951	.0000

VARIABLES NOT IN THE EQUATION

Variable	Beta In	Partial	Min Toler	T	Sig T
EDU	.022521	.030951	.977207	.266	.7907

Research Question Number Four

Is there a significant difference between the variables that predict success for male candidates and the variables that predict success for female candidates?

According to Messmer and Solomon (1979), research question number four requires that one additional regression be calculated. This fourth regression uses the same predictors as in research questions one through three except that a dummy variable is used for the sex of the applicant.

This dummy variable model yields slightly different results as can be seen in Table 27. The addition of the variable sex does very little to the adjusted R^2 obtained. The combined R^2*Adjusted* was 0.45933. The addition of the variable sex raises that only to an R^2*Adjusted* of 0.46275. The coefficient obtained with this new variable is slightly larger than one (1.165536), and it is positive indicating that males receive a slightly larger score than women on the exam.

Table 21
MULTIPLE REGRESSION OF AVERAGE SCORE FOR ALL CANDIDATES
ONTO PREDICTOR VARIABLES
ACT, SEX AND EXPERIENCE

Multiple R	0.68822
R Square	0.47364
Adjusted R Square	0.46275
Standard Error	5.11088

VARIABLES IN THE EQUATION

Variable	B	SE B	Beta	T	Sig T
ACT	1.045264	.095813	.657466	10.909	.0000
EXP	.396737	.117832	.203033	3.367	.0010
SEX	1.165536	.839073	.083766	1.389	.1669
Constant	44.528313	3.2326513		19.140	.0000

Each of the four models developed are then subjected to an analysis of variance (see Table 28) and the results used to test the homogeneity of variance between the male and female model. This test was a two-tailed *F* test of the ratio of the male residual mean square to the female residual mean square. This calculation resulted in the following:

$$F = MSE_{Female}/MSE_{Male} \qquad (1)$$

$$F = 27.0516/25.8357$$

$$F = 1.047$$

Based on the above, the hypothesis of equal residual variances fails to be rejected at the .05 level. It is not necessary, therefore, to adjust the model for heterogeneity. Had adjustment been necessary a weighted least squares procedure could have been developed using the residual root mean squares of the male and female model.

Homogeneity of variance, however, is not sufficient by itself to demonstrate the absence of differential predictability. It is necessary also to evaluate the equality of slopes and intercepts.

Table 22

Analysis of Variance for Male, Female, Combined and Dummy Variable Model

Source		*df*	Sum of Squares	Mean Square	F
Male Model:	Regression	1	1456.4808	1456.4808	57.94462
	Residual	69	1782.7530	25.8357	
Female Model:	Regression	2	1908.0656	954.0328	34.62710
	Residual	75	2028.8700	27.0516	
Combined Model:	Regression	2	3357.8402	1678.9201	63.86786
	Residual	146	3837.9606	26.2874	
Dummy Variable Model:	Regression	3	3408.2417	1136.0806	43.49284
	Residual	145	3787.5590	26.1211	

To determine the equality or inequality of slopes it should be noted that the separate regression lines for the male and female model partially explain the residual variance in the dummy variable model. Kmenta (1971) points out that as the difference in the slopes increases, the portion of the residual variance accounted for by the two lines also increases. Furthermore, "the variance formed by pooling the residual sums of squares from the two separate regression lines or planes is an estimate of the residual variance assuming differences in the two models" (Messmer & Solomon, p. 863, 1979). Data from Table 28 can, therefore, be used to develop a one tailed *F* test of the differences in slope. This is accomplished by subtracting the residual sum of squares for the male and female model from the residual sum of squares of the dummy variable model. This results in an estimate of the portion of the residual variance in the Dummy Variable model accounted for by the different slopes.

$$SSE_{difference(slope)} = SSE_{Dummy\ Variable} - (SSE_{Male}+SSE_{Female})$$

$$= 3787.5590 - (1734.3659 + 2066.3718)$$

$$= -13.1787$$

This difference is then divided by the difference in the number of degrees of freedom between the combined and the dummy variable model.

$$MSE_{difference} = SSE_{difference} / df_{Dummy\ Variable} - df_{male} - df_{female}$$

$$= 13.1787 / 146 - 69 - 75$$

$$= -6.5893$$

The pooled Mean Square Error is then calculated by:

$$MSE_{Combined} = (SSE_{Male} + SSE_{Female}) / (df_{Male} + df_{Female})$$

$$= (1782.3659 + 2028.8700) / 69 + 75$$

$$= 26.4669$$

A one-tailed F test of the differences in slope can then be calculated as:

$$F_{(2,144)} = MSE_{difference} / MSE_{Combined}$$

$$= -6.5893 / 26.4669$$

$$= 0.2491$$

As this test is not significant at the .05, level the null hypothesis of no difference in slope is not rejected, and it is concluded that the slopes are the same.

The test of the intercept is obtained by determining if the mean of the criterion variable obtained by use of the male model is significantly different from the criterion variable obtained by use of the female model. Since the male and female model have been determined to have homogeneous variance and equal slope, this relationship can be determined by the standard regression formula. Recall that the regression formula is:

$$Y = a + bX + Error$$

Therefore $a_1 = Y_1 - bX_1$

$a_2 = Y_2 - bX_2$

Inasmuch as bX_1 is assumed equal to bX_2, then the test of intercept is a two tailed test of the difference between Y_1 and Y_2. Recall that previous tests have shown the planes of the models are parallel and the variances homogeneous, therefore, the difference between the sum of square residuals in the Dummy Variable model and the Overall model represent that portion of the residual sum of squares explained by the dummy variable. It is calculated as:

$$SSE_{difference\,(intercept)} = SSE_{Combined} - SSE_{Dummy\ Variable}$$
$$= 3837.9606 - 3787.5590$$
$$= 50.4016$$

Dividing the difference sum of square residuals by the difference in the degrees of freedom yields the corresponding mean square residual which represents that portion of the estimated variance due to the dummy variable. It is calculated as:

$$MSE_{difference\,(intercept)} = SSE_{difference\,(intercept)} / df_{(D.V.)} - df_{(Combined)}$$
$$= 50.4016 / 3 - 2$$
$$= 50.4016$$

However, since "the dummy variable is merely an additive constant which is the difference between means, a test of the portion of the estimated variance due to the dummy variable is the same as a test of the difference of the two means (Messmer & Solomon, 1979, p. 865). The *F* ratio in this test is, therefore, a one-tailed test calculated as:

$$F_{(1,145)} = MSE_{difference\,(intercept)} \;/\; MSE_{Dummy\ Variable}$$

$$= 50.4016 \;/\; 26.1211$$

$$= 1.9295$$

Based on this *F* test the null hypothesis of equal intercepts is not rejected.

The results of the three tests of variance, slope and intercept indicate that differential predictability is not present in this study and that the same model can be used to predict success for males and for females. We, therefore, fail to reject the null hypothesis that there is no significant difference between the predictors of success for all candidates taking the exam and the predictors of success for males and females taking the Certified Public Accountants Exam.

CHAPTER 5

SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

SUMMARY

Background of the Problem

Many students enter college and major in accounting with the expectation that one day they will become Certified Public Accountants. Public accounting firms also evaluate potential employees to determine the likelihood of the applicant becoming a CPA and progressing in the firm. Many students, however, find they are unable to pass the exam, and as education requirements to sit for the exam continue to rise many anticipate that the number of accounting graduates not becoming CPA's will continue to increase.

Numerous researchers have attempted to determine the variables that predict success on the CPA exam and in accounting employment. No studies have been identified, however, that determine if the predictors for male candidates are significantly different from predictors for female candidates.

Purpose of the Study

The purpose of the study is to answer the following research questions:

1. What are the variables that predict success for all candidates taking the Uniform Certified Public Accountants Exam?
2. What are the variables that predict success for males taking the Uniform Certified Public Accountants Exam?
3. What are the variables that predict success for females taking the Uniform Certified Public Accountants Exam?
4. Is there a significant difference between the variables that predict success for all candidates and the variables that predict success for males and females taking the Uniform Certified Public Accountants Exam?

Subjects Studied

The study consisted of candidates sitting for the May, 1994, Certified Public Accountants Exam. All candidates had previously taken a CPA review course of at least 100 hours duration. Identification of the subjects came from a mailing

list provided by the National Association of State Boards of Accountancy (NASBA). The NASBA also provided multiple sets of mailing labels that were used to send the questionnaire to the candidates.

Method of Analysis

A review of the literature was conducted to determine the exam predictor variables that had been identified by researchers in the past. Reflecting the importance of the question, a number of studies were identified. From these studies, a potential list of predictor variables were identified.

A review was also conducted to determine if the theory of differential predictability had been examined to determine the validity of using the same variables to predict success for both males and females. No studies of CPA exam candidates using this theory could be identified.

Using the preliminary predictor variables, a questionnaire was developed to measure various attributes of the candidates. The questionnaire was mailed to 486 candidates and 115 candidates replied. A second mailing yielded a total response of 168 or 34.57%.

The data collected from the questionnaires were recorded and tabulated in DBase IV which was used to create an SPSS file. Cross-tabulations for the data were developed and descriptive statistics were compiled. Stepwise regression techniques were developed to determine the most suitable predictors for the various groups studied. The prediction model for males and females were then analyzed to determine if there were differences between the residual variance, intercept and slope.

Results of the Study

The first research hypothesis under investigation stated that:

1. There is a significant relationship between the selected predictor variables for all candidates taking the Certified Public Accountants Exam.

The study revealed that three of the six variables showed a significant relationship with the criterion variable. However, the additional r value for UGPA was close to zero and could be interpreted as having little association with average score on the exam. The variables that correlated significantly with success on the exam was ACT score and years of professional experience. Accordingly, the first research

hypothesis failed to be rejected. The final model developed was:

Ave Score = 45.1707 + 1.04301 (ACT) + 0.39037 (EXP) ± 10.2543

The second research hypothesis under investigation stated that:

2. There is a significant relationship between the selected predictor variables for males and success on the Certified Public Accountants Exam.

The study revealed that only one of the six variables showed a significant relationship with the criterion variable. Unlike the model for all candidates, professional work experience was not significantly correlated with success on the CPA exam for males. The variable that correlated significantly with success on the exam was the ACT score. Thus the second research hypothesis failed to be rejected. The final model developed was:

Average Score = 45.93348 + 3.352518 (ACT) ± 10.02712

The third research hypothesis under investigation stated that:

3. There is a significant relationship between the selected predictor variables for females and success on the Certified Public Accountants exam.

As in the combined model, success for females was significantly related to ACT score and years of professional experience. Again, the research hypothesis fails to be rejected. The resulting model is:

Ave Score = 44.25447 + 1.00629 (ACT) + 0.58943 (EXP) ± 10.4578

The fourth research hypothesis under investigation stated that:

4. There is a significant difference between the predictors of success for all candidates taking the exam and the predictors of success for males and females taking the Certified Public Accountants Exam.

An additional dummy variable model which included sex as a predictor was developed. Tests were then conducted to determine if there was a significant relationship between residual variance, slope and intercept of the various models. Based on this, the research hypothesis is rejected, and it is concluded that one model can be used to predict success on the exam for both males and females.

CONCLUSIONS

The results of this study matched previous research in showing that the single best predictor of success on the CPA

exam is past success in education. Different studies have found that either a student's score on the ACT exam or their UGPA predicted success best. In this study, the two predictors of ACT and UGPA were so highly correlated that only the best predictor of the two (ACT) was used.

Some, though not all, previous studies have also linked professional experience with success on the exam. While not as strong a predictor, in this study experience was also found to be a significant predictor of success for females and was not correlated with ACT.

The study also determined that the predictors of success are not different for males and females. This is a critical finding because of the large number of females now taking the exam and the lack of previous research in the area.

This study should be regarded as descriptive in nature and should be used as prescriptive only after careful consideration. The reader is reminded that regression equations are created by fitting equations to data where the data values are within discrete ranges. The model created, therefore, is only useful in predicting a response variable when the values for the independent variables are within the bounds of the fitted data.

Application of the research findings could take several directions. The Board of Examiners of the American Institute of Certified Public Accountants has been attempting to determine educational needs to sit for the exam. The study seems to indicate that the present direction of requiring more education may not be useful. Based on the results of the study the Board might wish to place more emphasis on the quality of the education.

RECOMMENDATIONS

Amount and type of education has been examined as a predictor for success on the exam by several researchers. Unfortunately, the results of the research has been mixed. Some researchers have found a significant relationship while others have not. A cursory review of the success of CPA candidates by type of education seems to reveal that a correlation exists. In this study, however, the correlation was not determined to be significant. Because of the great emphasis the profession is placing on additional education today as a prerequisite for taking the exam, additional study in this area is needed.

This study was limited to candidates who had taken a CPA review course of 100 hours or more. This additional education

may have negated some of the differences between persons with a bachelors degree and those with a graduate degree. A study of all candidates may reveal different results.

This study was limited to candidates in the State of Tennessee who have in the past had a success rate similar to the national average. Because of changes in the format of the exam and changes in the requirements to sit, that similarity may no longer exist. Additional study on a national basis might also provide different results.

The predictor variables examined in this study related to quantitative data obtained from the candidate. Little research has been performed to identify those qualitative factors innate to the successful candidate. This would provide one additional element to employers seeking to identify successful candidates.

This study determined that the same model can be used for predicting success on the exam for both males and females. Additional study is warranted to determine if differential predictability exists for candidates of different race. This could be invaluable in improving the number of successful minority CPAs.

Because ACT score was a better predictor of success than undergraduate grade point average, accounting education may

not be as important to success on the exam as general intelligence. It is interesting that the best single predictor of success for all candidates is a test that is usually taken prior to entering college. Past research on education has focused on accounting education. Some future research may need to be directed toward other types of formal education to determine if success in specific courses might be significant.

APPENDICES

APPENDIX A

LETTER TO CANDIDATES AND QUESTIONNAIRE

^D

^A
^A
^A

Dear: ^A:

Your name was selected from a list of candidates who sat for the May 1994 CPA exam. You are being asked to take part in a research project designed to determine the variables that predict success on the exam. You can assist in this research by filling out the enclosed questionnaire and allowing us to compare this data with your grades on the exam. The reason for requesting you name is only for purposes of determining responses. Your name will not be published in any form and no data will be released which could be identified with you.

If you have any questions regarding this questionnaire please feel free to call me collect at (901) 722-0320. Your cooperation may help future candidates in their quest to become Certified Public Accountants.

Thank you for your assistance

Sincerely

Judy Anne Ramage
Visiting Professor of Accounting

CONFIDENTIAL QUESTIONNAIRE

CONTROL_____

Name_____ Date of Birth_____
Last First MI

Undergraduate School Attended_____ Major_____

Year in which you received your bachelors degree: Check 1.
Before 1987____, '87_____, '88_____, '89_____, '90_____, '91_____, '92_____, '93_____, '94_____

Undergraduate GPA _____. ACT Score_____ SAT Score_____ GMAT Score _____

Graduate School Attended_____ Major_____
Graduate degree obtained- Check 1: MBA____, M.S. Acct____, MPA_____, Other (Specify)_____

Year in which you received your masters degree - Check 1:
Do not have ____, Before '87____,'87____,'88____,'89____,'90____,'91____,'92____,'93____,'94____

Total undergraduate credit hours completed_____ Total graduate hours completed _____

Number of undergraduate hours in accounting _____ Number of graduate hours in accounting_____

Did you complete a formal CPA Review Course prior to sitting for the May '94 Exam? Yes___ No___

If yes, what is the name of the review course _____

Race: White_____, Black_____, Hispanic_____, Other_____. Sex: Male_____, Female_____

Years of employment since undergraduate graduation:_____
How many of the above years of employment were in the following:

1._____Public Accounting (Auditing)
2._____Public Accounting (Tax)
3._____Public Accounting (MIS)
4._____Public Accounting (General)
5._____Industrial Accounting
7._____Governmental Accounting
8._____Teaching
9._____Other (Please specify)_____

How many times have you sat for the exam before May, 1994? ("0" if none)_____

For each part that you sat for May 1994, please record the grade received:

Auditing_____, Law_____, Accounting & Reporting_____, Financial Accounting & Reporting_____

Which parts of the exam have you passed previously? (Check all that apply).

Auditing_____, Law_____, Theory_____, Practice_____

Thank you for your assistance. Please return the completed questionnaire in the enclosed envelope.

Appendix B

VARIABLES CODE LIST

Variables Code List

Variable	Code	Description
RACE	0	White
	1	Black
	2	Hispanic
	3	Other
SEX	0	Male
	1	Female
GPA		Overall grade point average at time of baccalaureate graduation. Minimum score 2, maximum score 4, in increments of one-tenth.
ACT		Highest composite score obtained for admission to baccalaureate program. Minimum score 0, maximum score 33, in increments of one.
AGE		Candidate age at time of sitting for exam.
DEG	0	BS or BA, no graduate degree.
	1	MBA with concentration in accounting.
	2	MS in Accounting
	3	Graduate degree without accounting emphasis
EXP		Number of years in a position that requires accounting education

APPENDIX C

DESCRIPTIVE STATISTICS FOR PREDICTORS OF ALL CPA EXAM CANDIDATE SCORES

Descriptive Statistics for Predictors of
All CPA Exam Candidate Scores

SEX

Mean	.481	Std Error	.040	Median	.001
Mode	.000	Std Deviation	.501	Variance	.251
Kurtosis	-2.020	Std Err. Kurt	.386	Skewness	.078
S E Skew	.194	Range	1.000	Minimum	.000
Maximum	1.000	Sum	75.000		

RACE

Mean	1.100	Std Error	.036	Median	1.000
Mode	1.000	Std Deviation	.421	Variance	.177
Kurtosis	32.121	Std Err. Kurt	.407	Skewness	5.341
S E Skew	.205	Range	3.000	Minimum	1.000
Maximum	4.000	Sum	154.000		

Descriptive Statistics for Predictors of
All CPA Exam Candidate Scores
(Continued)

EDUCATION

Mean	.263	Std Error	.035	Median	.000
Mode	.000	Std Deviation	.442	Variance	.195
Kurtosis	-.827	Std Err. Kurt	.386	Skewness	1.088
S E Skew	.194	Range	1.000	Minimum	.000
Maximum	1.000	Sum	41.000		

ACT SCORE

Mean	22.188	Std Error	.359	Median	22.000
Mode	22.000	Std Deviation	4.386	Variance	19.235
Kurtosis	-.544	Std Err. Kurt	.395	Skewness	-.031
S E Skew	.199	Range	20.000	Minimum	12.000
Maximum	32.000	Sum	3306.000		

Descriptive Statistics for Predictors of
All CPA Exam Candidate Scores
(Continued)

EXPERIENCE

Mean	5.609	Std Error	.291	Median	5.000
Mode	4.000	Std Deviation	3.634	Variance	13.207
Kurtosis	1.144	Std Err. Kurt	.386	Skewness	.414
S E Skew	.194	Range	20.000	Minimum	.000
Maximum	20.000	Sum	875.000		

AGE

Mean	30.226	Std Error	.543	Median	28.000
Mode	25.000	Std Deviation	6.561	Variance	43.045
Kurtosis	.913	Std Err. Kurt	.399	Skewness	1.291
S E Skew	.201	Range	28.000	Minimum	23.000
Maximum	51.000	Sum	4413.000		

Descriptive Statistics for Predictors of
All CPA Exam Candidate Scores
(Continued)

GRADE POINT AVERAGE

Mean	3.194	Std Error	.034	Median	3.200
Mode	3.000	Std Deviation	.417	Variance	.174
Kurtosis	-.184	Std Err. Kurt	.395	Skewness	-1.021
S E Skew	.199	Range	1.960	Minimum	2.000
Maximum	3.960	Sum	475.840		

APPENDIX D

DESCRIPTIVE STATISTICS FOR PREDICTORS OF MALE CPA EXAM CANDIDATE SCORES

Descriptive Statistics for Predictors of
Male CPA Exam Candidate Scores

RACE

Mean	1.030	Std Error	.021	Median	1.000
Mode	1.000	Std Deviation	.171	Variance	.029
Kurtosis	30.876	Std Err. Kurt	.578	Skewness	5.653
S E Skew	.293	Range	1.000	Minimum	1.000
Maximum	2.000	Sum	69.000		

EDUCATION

Mean	.320	Std Error	.054	Median	.000
Mode	.000	Std Deviation	.470	Variance	.221
Kurtosis	-1.418	Std Err. Kurt	.548	Skewness	.788
S E Skew	.277	Range	1.000	Minimum	.000
Maximum	1.000	Sum	24.000		

Descriptive Statistics for Predictors of
Male CPA Exam Candidate Scores
(Continued)

ACT SCORE

Mean	22.113	Std Error	.477	Median	22.000
Mode	22.000	Std Deviation	4.016	Variance	16.130
Kurtosis	-.368	Std Err. Kurt	.563	Skewness	.049
S E Skew	.285	Range	18.000	Minimum	14.000
Maximum	32.000	Sum	1570.000		

EXPERIENCE

Mean	5.373	Std Error	.468	Median	5.000
Mode	4.000	Std Deviation	4.053	Variance	16.426
Kurtosis	1.449	Std Err. Kurt	.548	Skewness	.248
S E Skew	.277	Range	20.000	Minimum	.000
Maximum	20.000	Sum	403.000		

Descriptive Statistics for Predictors of
Male CPA Exam Candidate Scores
(Continued)

AGE

Mean	29.824	Std Error	.801	Median	27.000
Mode	25.000	Std Deviation	6.602	Variance	43.580
Kurtosis	.976	Std Err. Kurt	.574	Skewness	1.345
S E Skew	.291	Range	27.000	Minimum	23.000
Maximum	50.000	Sum	2028.000		

GRADE POINT AVERAGE

Mean	3.072	Std Error	.052	Median	3.100
Mode	3.000	Std Deviation	.436	Variance	.190
Kurtosis	-.296	Std Err. Kurt	.563	Skewness	-1.176
S E Skew	.285	Range	1.960	Minimum	2.000
Maximum	3.960	Sum	218.110		

APPENDIX E

DESCRIPTIVE STATISTICS FOR PREDICTORS OF FEMALE CPA EXAM CANDIDATE SCORES

Descriptive Statistics for Predictors of
Female CPA Exam Candidate Scores

RACE

Mean	1.164	Std Error	.065	Median	1.000
Mode	1.000	Std Deviation	.553	Variance	.306
Kurtosis	18.206	Std Err. Kurt	.555	Skewness	4.119
S E Skew	.281	Range	3.000	Minimum	1.000
Maximum	4.000	Sum	85.000		

EDUCATION

Mean	.210	Std Error	.046	Median	.000
Mode	.000	Std Deviation	.410	Variance	.168
Kurtosis	.110	Std Err. Kurt	.529	Skewness	1.452
S E Skew	.267	Range	1.000	Minimum	.000
Maximum	1.000	Sum	17.000		

Descriptive Statistics for Predictors of
Female CPA Exam Candidate Scores
(Continued)

ACT SCORE

Mean	22.256	Std Error	.535	Median	22.000
Mode	22.000	Std Deviation	4.722	Variance	22.297
Kurtosis	-.682	Std Err. Kurt	.538	Skewness	-.087
S E Skew	.272	Range	20.000	Minimum	12.000
Maximum	32.000	Sum	1736.000		

EXPERIENCE

Mean	5.827	Std Error	.357	Median	5.000
Mode	4.000	Std Deviation	3.209	Variance	10.295
Kurtosis	.430	Std Err. Kurt	.529	Skewness	.426
S E Skew	.267	Range	15.000	Minimum	.000
Maximum	15.000	Sum	472.000		

Descriptive Statistics for Predictors of
Female CPA Exam Candidate Scores
(Continued)

AGE

Mean	30.577	Std Error	.741	Median	29.000
Mode	27.000	Std Deviation	6.548	Variance	42.871
Kurtosis	1.030	Std Err. Kurt	.538	Skewness	1.283
S E Skew	.272	Range	28.000	Minimum	23.000
Maximum	51.000	Sum	2385.000		

GRADE POINT AVERAGE

Mean	3.304	Std Error	.042	Median	3.330
Mode	3.000	Std Deviation	.369	Variance	.136
Kurtosis	-.171	Std Err. Kurt	.538	Skewness	-.845
S E Skew	.272	Range	1.600	Minimum	2.300
Maximum	3.900	Sum	257.730		

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