The Development and Use of a Standardized Test for the Introductory Undergraduate Managerial Finance Course

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Abstract

The purpose of this paper is to develop a criterion-referenced, standardized test that can be used to measure student mastery of a core set of learning objectives commonly included in the introductory undergraduate managerial finance course. A justification of the need for a standardized exam is presented, as well as the composition and content of the standardized test. Procedures used to validate and pilot-test the examination, and suggestions for administering the exam are also discussed.

I. Introduction

Accrediting agencies, such as AACSB, require statements of student learning outcomes and the development of assessment programs measuring the achievement of such outcomes. Lopez (1998) indicates that all six regional accrediting associations require that the institutions they accredit assess student learning across all their academic programs. Increased emphasis on assessment plans by accrediting entities has led to the formation of assessment committees at almost every college and university.

Outcomes assessment is a method for determining whether students are learning and retaining the information and skills they need for success in their career field. To perform assessment, tools must be developed that measure the degree to which students have mastered this information and skill set. This measurement of the output of the education process is then compared to the goals for the program and any deviations are corrected via feedback to the curriculum. An assessment plan consists of three components. First are the goals (learning objectives), which define what is expected of students. Second are measures of achievement of these goals, and third are feedback mechanisms to correct and improve the educational process. (See Schaeiwitz, 1998.)

While there seems to be agreement on the need to effectively measure clearly defined learning objectives, there is considerable disagreement about the methods that should be used to measure these objectives. We suggest that an effective assessment tool should:

1) measure knowledge and understanding of clearly defined learning objectives.
2) assess higher-order critical thinking skills, such as problem solving and synthesis of knowledge.
3) measure “value-added” by the program or course; that is it should distinguish between what the student learned in the course (program) and what the student already knew prior to entering the course (program).
4) minimize racial, cultural, gender and other biases.
The use of a standardized test covering basic financial concepts is one method of achieving these assessment goals. There are several other methods of assessing student learning, including non-standardized tests, portfolios, capstone projects, questionnaires/surveys, and student interviews. Each of these methods can provide valuable assessment information, but none of these meet the above criteria as well as standardized exams.

For example, if used correctly, student portfolios are effective at measuring knowledge and understanding of learning objectives, assessing higher-order thinking skills, and measuring value added over a program of study (Criteria 1-3). The goal of student portfolios is to gather information on student accomplishments on assignments and projects that demonstrate accomplishment of stated goals. Coursework that demonstrates students’ abilities related to stated goals is identified and added to the portfolio. One of the main disadvantages of using portfolios for assessment purposes is difficulty in administration and scoring. Extensive coordination is needed to ensure that student portfolios are maintained over the desired time period and to ascertain that the portfolios are scored consistently. Similarly, while non-standardized tests can be more exactly tailored to the specific learning objectives in a class, they generally do not allow accurate comparisons across students in different sections of the class (if taught by different instructors), or longitudinal comparisons of students. Also, non-standardized tests generally have not been tested for reliability and validity. (See Schaeiwitz, 1998, for discussion of advantages and disadvantages of several other assessment methods.)

While it is inappropriate to rely on standardized tests as the sole measure of assessment for a program or course, few assessment methods offer the wealth of comparable data available from standardized tests. In addition to possessing the attributes of an effective assessment tool listed above, a standardized test can be used to measure readiness for advanced coursework, and to track improvements or declines in readiness through time or across alternative course formats (such as evening, day, summer, or distance learning formats). In addition, results of the tests can be used with constituency groups (employers, potential donors, business community, potential students, etc.) as an objective indicator of the quality of an institution’s finance program. Clyde (1994) cites many of these advantages to argue for the usefulness of the standardized test for business schools, with each discipline having its own exam(s).

Unfortunately, there are very few standardized tests available in the finance field. The Educational Testing Service (ETS) offers a Major Field Test in Business that covers eight different areas of business, with approximately 12% of the exam covering finance topics. According to Clyde (1994), the Core Curriculum Assessment Program (available since 1987) includes sample test questions in seven business disciplines, including finance. However, because each institution constructs a unique exam from the available questions, cross-sectional comparison to other institutions is difficult. Some schools use the first level Certified Financial

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1 This list was compiled after review of similar listings in Carey (2001) p. 62-66, and Mehrens and Lehmann (1987) p. 35.
Analyst (CFA) exam (which has approximately 250 multiple-choice questions and 5-10 essays) as a measure of program effectiveness. However, the CFA exam focuses primarily on the investments area and may be too rigorous for many finance students.

The lack of availability of standardized finance tests may stem from the diversity in the content of finance courses, particularly upper-level courses. The relative emphasis placed on topics such as synthetic and real options, financial engineering, accounting information, and international topics varies by instructor and by institution. Because of these substantial differences in the learning objectives for finance programs, it is difficult to develop a comprehensive standardized finance program examination.

There appears to be, however, more agreement on the learning objectives for the beginning course in corporate finance than on objectives in upper level finance courses. A survey by Cooley and Heck (1996) asked a stratified random sample of finance professors to rank a list of twenty topics usually found in the chapter titles of introductory finance textbooks. There was general agreement on the importance of time value of money, capital budgeting, risk and return, security valuation, and cost of capital concepts. These topics had high mean scores (in excess of four on a scale of one to five, with five indicating most important), and relatively low standard deviations for these scores. The survey also indicated considerable agreement on two additional topics, financial statement analysis and capital structure (both had mean scores over 3.50). Because we perceive a relatively high level of agreement on the core learning objectives for the introductory course in corporate finance, we have chosen to focus our efforts on developing a standardized test for the introductory undergraduate managerial finance course.

The following section contains a description of the process for constructing a valid and reliable test. Then, suggestions for exam administration are given.

II. Methodology

A. Test Construction and Validation

Most commercially developed standardized tests are norm-referenced instead of criterion-referenced. Norm-referenced tests compare the relative knowledge of students. Results are often reported as percentile rankings, and reflect relative, not absolute achievement. Criterion-referenced tests judge whether students have mastered a set of standard objectives. The students compete against a set of standards, not against each other. Criterion-referenced tests require specification of the set of standards, and specification of what constitutes “mastery” of those standards. (See Ornstein, 1993.) Although peer rankings are certainly of interest to users of a standardized test in finance, it is our belief that the primary objective of such a test is to measure student mastery of a clearly defined set of course objectives. Therefore, we constructed a criterion-referenced standardized test.

A well-constructed test exhibits the characteristics of reliability and validity. A reliable test is one that is free from errors of measurement and provides consistent results across different

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2 For a more complete discussion of reliability and validity, see Gredler (1999), Popham (1995), Mehrens and Lehmann (1987), and Berk (1980).
testing occasions and across alternative forms of a test. Trick questions, ambiguous wording, student guessing, exam environment, grader inconsistency, and test length can all affect reliability. An assessment is valid when it actually measures what it purports to measure. There are two types of validity: content validity and construct validity. Content validity measures whether a test adequately samples course content and objectives. A valid test should sample the subject matter in a way that ensures the broadest possible representation of the subject in the examination. (See Fuhrman, 1996.) Construct validity measures the extent to which a test reveals the amount learned, and not some extraneous variable such as skill at guessing.

Downing and Haladyna (1997) and Wergin (1988) suggest a process for test item validation that begins with the development of a test “blueprint.” This blueprint lists the topic areas to be covered and the types of questions to be used to cover each topic (such as recall, skills application, analysis, problem-solving, or synthesis). The blueprint shows the weight assigned to each topic, the quantity of each type of question used to test a topic, and the difficulty level of questions for each topic. The rest of our validation process follows Downing and Haladyna (1997) closely.

As the initial step in preparing a standardized exam for the introductory managerial finance course, we developed a preliminary blueprint for the test with topics chosen based on the Cooley and Heck (1996) study. The topic areas included in the blueprint were time value of money (26%), capital budgeting (17%), risk and return (13%), security valuation (17%), cost of capital (10%), financial statement analysis (10%) and capital structure (7%). The numbers in parentheses reflect the approximate percentage of total test points allocated to each of the topics. The weights for each topic area were initially assigned by the authors based upon the scores for each topic in the Cooley and Heck (1996) paper.

We then asked a finance faculty member at each of a pilot group of seven colleges and universities to evaluate and modify the initial blueprint. The pilot group of institutions was selected to ensure geographic diversification, as well as diversification in the type of institution (private, state-supported, research, and teaching). A list of the schools participating in the pilot group is shown in Appendix 1. The participating professors generally agreed with the list of topics and the weights applied to each topic. Two of the professors advocated including working capital management and dividend policy as additional topics. Although these topics are taught in many introductory finance courses, they do not appear to be generally accepted as core topics for this course. Because we are interested in developing a test that will cover the topics taught in a majority of introductory finance courses, these topics were not included in the test. A further extension of the standardized test concept would be to develop question “modules” in these areas, which could be added to the test by professors covering these topics in their courses. Appendix 2 shows the final test blueprint for the standardized test.

After revising the test blueprint based upon feedback from the pilot group, the authors developed a preliminary pool of approximately 70 multiple-choice test questions covering the topic areas included on the blueprint. The pilot group professors were asked to review each question in the preliminary pool for content, question clarity and accuracy, and to rate the quality of each question. ³ In addition, the reviewers were asked to recommend wording changes or deletions to

³ The complete pool of questions is available from the authors upon request.
reduce bias and ambiguity, to rate the difficulty of the question, and to identify each question as one of three types (concept/theory, definition/recall or problem).

A draft version of the standardized test was then constructed by the authors, based on responses obtained from professors in the pilot group. The draft version of the test included thirty multiple-choice questions. A thirty-question exam was selected because our goal was to create an exam that can be administered in a 50-minute class period. The exam contains several questions that involve computations, therefore 30 questions appears to be a reasonable length (this was validated by administration of the test to four sample classes). The multiple-choice format was chosen because this question format is easy to grade and has less potential for subjectivity in grading than open-ended response formats. To be certain that both lower and higher-order learning skills are tested, the multiple-choice questions are of three main types: conceptual/theory, definition/recall and problem/evaluation.

Multiple-choice (selected response) test questions have been criticized as being less effective than constructed response (open-ended) questions for testing higher-level concepts such as problem solving and synthesis. Squires (1998) argues that much of the criticism results from the fact that many times multiple-choice questions are improperly designed and poorly constructed. Squires (1998) and Haladyna and Downing (1989) provide a variety of rules and guidelines for multiple choice item construction to ensure test items that are well written and that test important finance concepts validly and reliably. Squires (1998) provides guidelines for constructing correct, clear questions. Haladyna and Downing (1989) provide guidelines for procedural item writing, content item writing, stem construction, general option development, correct option development, and distractor development. We followed these guidelines closely when developing our question pool. (See also Hansen and Dexter, 1997; and Aiken, 1987.)

In the final stage of the validation process, the draft version of the standardized test was administered as a final exam in a total of four classes with approximately 130 students tested. Test administration statistics are found in Table 1. The mean score was 21.6 of 30 possible points (72%) and the median score was 22 of 30 (72.2%). Scores ranged from 12/30 (40%) to 30/30 (100%), with the frequency distribution of scores displaying a nearly bell-shaped curve. Results of the pilot test were used to further identify poor questions, and to determine if the exam is the appropriate length for a 50-minute testing period. An item analysis, including item response patterns, was conducted to analyze question difficulty, correlation, and discrimination statistics. Hoepfl (1994) recommends using the item response patterns to analyze the frequency with which each alternative response is selected. If no students respond to one or more alternatives, the exam writer may wish to consider changing the alternative(s) if possible. If students select a distractor with equal or greater frequency than the correct answer, the test item should be evaluated for complexity, wording, or misleading language. There were three questions in which a distractor

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4 The test was administered to students in three introductory managerial finance courses taught by graduate assistants at the University of Nebraska-Lincoln, and to students in one course at Minnesota State University Moorhead. The 130 students were diversified in terms of gender and ethnicity, and included approximately 25 international students from countries including Turkey, Malaysia and Germany. The majority of the students were traditional-aged college students (18-22).

5 Item response patterns are available from the authors upon request.
was chosen more often than the correct answer. Upon analysis of the questions and distractors, the authors determined the distractors were reasonable in the context of the questions.

Results of the exam administration indicate that the exam is appropriate for a 50-minute testing period. A number of the highly rated questions in all topic areas were rated as “difficult” by the pilot professors (i.e. the average difficulty rating was above 3.50 on a scale of 1 to 5). However, examination of the statistics from the student test results indicates medium difficulty for these questions. Thus, while the test blueprint predicts a relatively difficult test, the actual student results indicate an average level of difficulty. A copy of the final version of the standardized exam is found in Appendix 3.6

B. How the Exam Fits the Criteria for an Effective Assessment Instrument

The standardized exam developed using this process meets all the criteria for an effective assessment tool enumerated in the introduction. The exam was carefully written to include questions of different cognitive levels, including recall/definition, concept/theory, and problem-solving (Criteria 1 and 2). The use of the pilot professor group to edit the test blueprint and to read, rate, and edit questions minimizes racial, cultural, gender, and other biases (Criterion 4). The use of the pilot professor group and the preliminary test administration ensure an exam that is valid and reliable (Criterion 7).

The multiple-choice format is easy to administer and score and allows for little or no subjectivity in the grading process (Criterion 6). The continued use of the exam by a business school assessment program allows for longitudinal and cross-sectional student comparisons (Criterion 5). Finally, if the exam is administered in a pre-test, post-test format, value added is measured (Criterion 3).7

B. Words of Caution

Though multiple-choice exams are very useful assessment instruments, any kind of assessment tool has disadvantages. Multiple-choice tests are not appropriate for measuring certain skills, such as the ability to synthesize ideas, to write effectively, or to perform certain types of problem solving. Multiple-choice tests are often criticized as not being “authentic” assessments, where a student applies information and reasoning to situations that may be encountered in the “real world.” If the purpose of the assessment is to measure performance of a skill, multiple-choice tests are usually not appropriate. (See Fuhrman, 1996.)

Clyde (1994) indicates there may be some risk associated with using standardized exams as assessment instruments. He cites the main risk as possible overemphasis on the exam as a measure of student outcomes, which may lead to “teaching to the test.” However, as mentioned earlier, a standardized exam should only be used as one of several measures for program

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6 Exam solutions are available from the authors upon request.

7 Professors may choose to use this standardized exam as a pre- and post-test if the goal is to measure value added. If some time value of money concepts are taught in accounting or economics courses that are pre-requisites for the managerial finance course, administering the test as a pre-test and post-test will more accurately measure the incremental knowledge gained in the managerial finance course.
effectiveness. Clyde suggests that managing the quality of the exam by ensuring the exam is relevant, current, and thoughtfully composed is an important consideration. There are advantages and disadvantages to any type of assessment, so using a variety of assessment measures assures that a wide range of knowledge and skills are developed and measured.

III. Exam Administration

We recommend that the exam be administered at the end of the introductory undergraduate course in managerial finance. This is appropriate if the instructor or departmental goal is to determine how well students have learned a core set of skills for the course. The exam can also be administered as a pre- and post-test if the goal is to measure value added. (See footnote 7.)

In order to be able to accurately measure student performance, students must be motivated to do well on the test. Suggested motivations include making the score on the test all or part of the final exam grade, requiring the student to pass the test in order to pass the course, or mandating that students pass the test in order to register for upper level finance courses.

The test is constructed to allow completion within a 50-minute class period. If the test is given during a longer final exam period, the test could be used as the basis for a comprehensive portion of the final exam. An optional formula sheet is provided, as shown in Appendix 4, and professors may choose whether to allow students to use financial calculators. The test can be altered from one term to the next by rearranging the questions or question responses, by changing the numbers in the quantitative questions, or by substituting other similar questions from the complete question bank.

IV. Conclusion

A valid and reliable standardized exam can be a very important part of a finance program’s assessment activities. This paper proposes the development of a criterion-referenced standardized test designed to measure the achievement of course objectives commonly included in the undergraduate introductory course in managerial finance. The authors validated the test using a pilot group of professors and students, and suggest methods of incorporating the standardized exam into the undergraduate introductory managerial finance course.
References


Table 1: Test Administration Statistics

This table reports results from the administration of the draft version of the standardized test as a final exam in a total of four classes with approximately 130 students tested.

<table>
<thead>
<tr>
<th>Panel A: Test Statistics</th>
<th>Panel B: Frequency Distribution of Scores</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of students</td>
<td>129</td>
</tr>
<tr>
<td>Number of questions</td>
<td>30</td>
</tr>
<tr>
<td>Standard deviation of scores</td>
<td>3.61%</td>
</tr>
<tr>
<td>Number correct</td>
<td>25</td>
</tr>
<tr>
<td>Percent correct</td>
<td>11%</td>
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<tr>
<td>Mean score</td>
<td>21.6</td>
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<tr>
<td>Median score</td>
<td>22.0</td>
</tr>
<tr>
<td>Minimum score</td>
<td>12.0</td>
</tr>
<tr>
<td>Maximum score</td>
<td>30.0</td>
</tr>
<tr>
<td>Score</td>
<td>Frequency</td>
</tr>
<tr>
<td>30</td>
<td>1</td>
</tr>
<tr>
<td>29</td>
<td>3</td>
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<tr>
<td>28</td>
<td>3</td>
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<td>27</td>
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<td>26</td>
<td>8</td>
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<tr>
<td>25</td>
<td>11</td>
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<td>24</td>
<td>10</td>
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<td>23</td>
<td>16</td>
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</tr>
<tr>
<td>12</td>
<td>1</td>
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### APPENDIX 1
### INSTITUTIONS PARTICIPATING IN THE PILOT GROUP

<table>
<thead>
<tr>
<th>Participating Faculty Member</th>
<th>Institution</th>
<th>Location</th>
<th>Public/Private</th>
<th>Faculty Rank</th>
<th>Terminal Degree and Certifications</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Question Reviewers:</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Jill Bale</td>
<td>Doane College</td>
<td>Nebraska</td>
<td>Private</td>
<td>Associate Professor</td>
<td>PhD (Finance), CMA</td>
</tr>
<tr>
<td>Karl Borden</td>
<td>University of Nebraska At Kearney</td>
<td>Nebraska</td>
<td>Public</td>
<td>Professor</td>
<td>EdD, MBA</td>
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<tr>
<td>Jim Keyes</td>
<td>Florida International University</td>
<td>Florida</td>
<td>Public</td>
<td>Instructor</td>
<td>MBA, MSF, CCM, ChFC</td>
</tr>
<tr>
<td>Christine McClatchey</td>
<td>University of Northern Colorado at Greeley</td>
<td>Colorado</td>
<td>Public</td>
<td>Associate Professor</td>
<td>PhD (Finance)</td>
</tr>
<tr>
<td>Kevin Schieufer</td>
<td>Bellevue University</td>
<td>Nebraska</td>
<td>Private</td>
<td>Associate Professor</td>
<td>PhD (Finance)</td>
</tr>
<tr>
<td><strong>Question Preparation and Pilot Test Administration:</strong></td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Donna Dudney</td>
<td>University of Nebraska Lincoln</td>
<td>Nebraska</td>
<td>Public</td>
<td>Assistant Professor</td>
<td>PhD (Finance)</td>
</tr>
<tr>
<td>Marsha Weber</td>
<td>Minnesota State University Moorhead</td>
<td>Minnesota</td>
<td>Public</td>
<td>Associate Professor</td>
<td>PhD (Finance), MBA</td>
</tr>
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</table>

Note: All of the above participants have taught the introductory course in financial management multiple times and have at least seven years of full-time college or university teaching experience.
### Appendix 2: Test Blueprint

<table>
<thead>
<tr>
<th>Topic</th>
<th>Percentage of Total Test Points</th>
<th>Total Number of Questions</th>
<th>Recall/Definition</th>
<th>Concept/Theory</th>
<th>Problem-Solving</th>
<th>Question Difficulty*</th>
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<tr>
<td>Time Value of Money</td>
<td>26.0%</td>
<td>8</td>
<td>0</td>
<td>3</td>
<td>5</td>
<td>3 4 1</td>
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<tr>
<td>Capital Budgeting</td>
<td>17.0%</td>
<td>5</td>
<td>1</td>
<td>3</td>
<td>1</td>
<td>0 2 3</td>
</tr>
<tr>
<td>Risk and Return</td>
<td>13.0%</td>
<td>4</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>0 1 3</td>
</tr>
<tr>
<td>Security Valuation</td>
<td>17.0%</td>
<td>5</td>
<td>1</td>
<td>2</td>
<td>2</td>
<td>0 3 2</td>
</tr>
<tr>
<td>Cost of Capital</td>
<td>10.0%</td>
<td>3</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>0 2 1</td>
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<tr>
<td>Financial Statement Analysis</td>
<td>10.0%</td>
<td>3</td>
<td>0</td>
<td>2</td>
<td>1</td>
<td>0 3 0</td>
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<tr>
<td>Capital Structure</td>
<td>7.0%</td>
<td>2</td>
<td>0</td>
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<td>0 0 2</td>
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<tr>
<td>Totals</td>
<td>100.0%</td>
<td>30</td>
<td>3</td>
<td>15</td>
<td>12</td>
<td>3 15 12</td>
</tr>
</tbody>
</table>

*Questions were rated by the pilot group participants on a scale of 1 to 5, with 5 representing the most difficult questions. An average difficulty rating of less than 2.50 is considered easy; a rating between 2.50 and 3.50 is considered medium; and a rating of greater than 3.50 is considered difficult.
Appendix 3: Standardized Exam

STANDARDIZED TEST FOR UNDERGRADUATE INTRODUCTORY COURSE IN MANAGERIAL FINANCE

Name _________________________________

MULTIPLE CHOICE

1. Given a discount rate of \( i \% \) annually, what is the present value of perpetuity with annual cash payments of \( C \)?
   a. \( C \)
   b. \( C/i \)
   c. \( C*i \)
   d. \( 2C/i \)

2. If all else is equal, which of the following statements concerning the time value of money is true?
   a. A single sum received five years from today has a lower present value than an identical single sum received seven years from today.
   b. A single sum discounted at \( 5\% \) will yield a lower present value than an identical single sum discounted at \( 7\% \).
   c. The future value of an annuity of \$5 per year is greater than the future value of an annuity of \$7 per year.
   d. The future value of an annuity earning \( 5\% \) is less than the future value of an identical annuity earning \( 7\% \).

3. How long (rounded to the nearest year) does it take for an investment to double in value if it earns \( 9\% \) annual interest?
   a. 6 years
   b. 7 years
   c. 8 years
   d. 9 years

4. Aunt Jane invested \$10,000 in a certificate of deposit (CD). The CD has a quoted APR of \( 8\% \), with interest compounded quarterly. What is the value of the CD at the end of five years (round your answer to the nearest dollar)?
   a. \$14,859
   b. \$14,693
   c. \$14,000
   d. \$10,800

5. First Security Bank offers a one-year Certificate of Deposit with a quoted APR interest rate of \( 6.50\% \). Interest is compounded quarterly. What is the Effective Annual Rate (EAR) for the CD?
   a. \( 6.50\% \)
   b. \( 6.55\% \)
   c. \( 6.66\% \)
   d. \( 6.70\% \)

6. The current nominal effective annual interest rate is \( 8\% \). If the expected inflation rate is \( 3\% \), what is the expected real interest rate? Use the full Fischer equation, not the approximation.
   a. \( 4.854\% \)
   b. \( 4.630\% \)
   c. \( 2.857\% \)
   d. \( 5.160\% \)
7. NBC offers two loans with identical terms (60 months), identical interest rates (10% annually), and identical principal amounts ($100,000). Loan A requires payments at the beginning of each month, starting immediately. Loan B requires payments at the end of each month, beginning 30 days from today. Which of the following is true?
   a. Loan A’s payments will be lower than Loan B’s payments.
   b. Loan B’s payments will be lower than Loan A’s payments.
   c. The payments on Loan A and Loan B will be the same.
   d. Not enough information is given to compute the payments.

8. Bill Jones is considering a stock investment with a cost of $8,000. Bill believes that the investment will return $100 per year in dividends for the next 5 years (all received at year-end) and that he will be able to sell the investment at the end of 5 years (immediately after the last dividend payment is received) for $9,500. If Bill’s expectations are correct, what is his annually-compounded return on the investment?
   a. 3.5%
   b. 5.0%
   c. 4.7%
   d. 3.9%

9. If a bond’s coupon rate is less than the current market interest rate on similar risk bonds, then
   a. the bond will sell at a premium.
   b. the bond will sell at a discount.
   c. the bond will sell for exactly par value.
   d. the bond could sell at either a premium or a discount, depending on the bond’s maturity.

10. If we assume the discounted cash flow (DCF) model of valuation, which of the following events would clearly reduce the value of Ephron, Inc. stock? You should assume that all other factors remain constant with any given change.
    a. Ephron announces that their researchers have developed a new product that will increase earnings growth to double the normal rate for the next two years. After that time, the growth rate will level off to normal.
    b. The market’s rate of return falls.
    c. Ephron is able to reduce the beta of its projects without affecting cash flows.
    d. Ephron announces that it will reduce its regular dividend payments to meet its annual debt obligations.

11. What is the present value of a 10% coupon (paid semiannually) bond, with a $1,000 face value and 10 years to maturity if the yield on similar risk bonds is 8%?
    a. $1,134.20
    b. $1,135.90
    c. $875.38
    d. $1,000.00

12. What is the maximum price a rational investor would pay for a stock that recently paid a dividend (D₀) of $2, has a constant perpetual growth rate of 6%, and a required rate of return of 14%? (Assume no transactions costs).
    a. $14.30
    b. $25.00
    c. $26.50
    d. $33.33

13. Bond A is a 5-year bond with a 10% coupon. Bond B is a 10-year bond with a 10% coupon. If interest rates on similar risk investments increase from 10% to 12%.
    a. the price of a 10-year bond will fall by more than the price of a 5-year bond.
    b. the price of a 10-year bond will fall by less than the price of a 5-year bond.
    c. the price of a 10-year bond will rise by more than the price of a 5-year bond.
    d. the price of a 10-year bond will rise by less than the price of a 5-year bond.
14. When using the Net Present Value method of evaluating capital investment alternatives, the implicit assumption is that the cash flows generated from the project are reinvested at
   a. the current risk-free rate.
   b. the project’s internal rate of return.
   c. the project’s modified internal rate of return.
   d. the firm’s cost of capital.

15. You are in charge of one division of Company X. Your division has four indivisible projects available, detailed below. If your division is subject to capital rationing, and you must select projects subject to a budget constraint of $5 million dollars, which set of projects should be accepted so as to maximize firm value?

<table>
<thead>
<tr>
<th>Project</th>
<th>Initial Outlay</th>
<th>IRR</th>
<th>NPV</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>$2 million</td>
<td>17%</td>
<td>$2,500,000</td>
</tr>
<tr>
<td>2</td>
<td>$1 million</td>
<td>14%</td>
<td>950,000</td>
</tr>
<tr>
<td>3</td>
<td>$1 million</td>
<td>10%</td>
<td>600,000</td>
</tr>
<tr>
<td>4</td>
<td>$3 million</td>
<td>8%</td>
<td>2,000,000</td>
</tr>
</tbody>
</table>

   a. Projects 1, 2, and 3
   b. Projects 1 and 4
   c. Projects 2, 3, and 4
   d. Projects 1, 2, 3, and 4

16. How is interest expense that is associated with a project treated in the capital budgeting process?
   a. It is treated as a cash outflow when estimating the incremental cash flows associated with a project.
   b. It is treated as a cash outflow in the initial outlay.
   c. It is not included in the cash flows, but is reflected in the discount rate if the weighted average cost of capital is used to discount the cash flows.
   d. The interest rate on debt is used as the discount rate in calculating the NPV.

17. Why should depreciation be considered in the calculation of incremental cash flows for a project?
   a. Depreciation should not be included in the calculation of incremental cash flows because it is not a cash expense.
   b. Although depreciation is not a cash expense, depreciation provides a tax shield that adds value to a project.
   c. Depreciation will affect the weighted average cost of capital for a project.
   d. Depreciation will determine the useful life of an asset.

18. Compute the Internal Rate of Return (IRR) (to the nearest whole percent) associated with the following project:

<table>
<thead>
<tr>
<th>Cash Flow in Period</th>
</tr>
</thead>
<tbody>
<tr>
<td>Initial Outlay</td>
</tr>
<tr>
<td>1</td>
</tr>
<tr>
<td>2</td>
</tr>
<tr>
<td>3</td>
</tr>
<tr>
<td>4</td>
</tr>
<tr>
<td>-$4,000</td>
</tr>
<tr>
<td>$1,400</td>
</tr>
<tr>
<td>$1,400</td>
</tr>
<tr>
<td>$1,400</td>
</tr>
<tr>
<td>$1,400</td>
</tr>
</tbody>
</table>

   a. 15%
   b. 18%
   c. 20%
   d. 16%

19. For an average firm, which of the following sources of capital generally has the higher cost?
   a. Newly-issued bonds.
   b. Newly-issued preferred stock.
   c. Newly-issued common stock.
   d. Retained earnings.
20. Shawhan Supply plans to maintain its optimal capital structure of 40 percent debt, 10 percent preferred stock, and 50 percent common stock for the foreseeable future. The required return on each component is: Debt = 8 percent; Preferred Stock = 10 percent; Common Stock = 16 percent. Assuming a 40 percent marginal tax rate, what after-tax rate of return must Shawhan Supply earn on its investments if the value of the firm is to remain unchanged?
   a. 18.00%
   b. 13.00%
   c. 12.20%
   d. 10.92%

21. Given the following information, determine the cost of internal equity using the Constant Growth Dividend Discount Model (DDM), and the Capital Asset Pricing Model (CAPM).

   Current Common Stock Price: $50
   Dividend Expected Next Year (D1): $2.50
   Constant Growth Rate Per Year: 8%
   Risk-free Rate: 6%
   Beta of Stock: 1.5
   Current Return on the Market Portfolio: 12%

   a. 8.05% DDM; 9.00% CAPM
   b. 11.00% DDM; 18.00% CAPM
   c. 13.00% DDM; 15.00% CAPM
   d. 8.05% DDM; 18.00% CAPM

22. All of the following statements regarding the beta of a security are true EXCEPT
   a. Beta measures the systematic portion of the risk of a security or portfolio.
   b. Stocks with high betas must also have high standard deviations.
   c. Beta can be calculated as the slope of a regression line that shows the past relationship between a stock’s return and the market’s return.
   d. A stock beta of 2.0 indicates that on average, the stock’s systematic risk is twice the systematic risk of the market.

23. The weighted average cost of capital is an appropriate estimate of a proposed project’s discount rate if:
   a. the proposed project’s risk is greater than or equal to the average risk of the firm’s existing projects.
   b. the proposed project’s beta is equal to the average beta of projects undertaken in this industry.
   c. the proposed project’s risk is less than or equal to the average risk of the firm’s existing projects.
   d. the proposed project’s risk is equal to the average risk of the firm’s existing projects.

24. An investor places 40% of her wealth in Asset A and 60% of her wealth in Asset B. Asset A has a beta of 1.25, while Asset B has a beta of 0.80. The risk-free rate is 6%, and the expected return on the market portfolio is 12%. Use the Capital Asset Pricing Model (CAPM) to estimate the required return for the portfolio.
   a. 12.30%
   b. 12.15%
   c. 11.88%
   d. 17.76%

25. Diversification will reduce the standard deviation of a two-stock portfolio:
   a. unless the returns for the two stocks are perfectly negatively correlated.
   b. if the returns for the two stocks are perfectly positively correlated.
   c. as long as the returns for the two stocks are less than perfectly positively correlated.
   d. as long as the returns for the two stocks are negatively correlated.
26. All of the following can cause net cash flow to differ from net income EXCEPT
   a. depreciation
   b. taxes
   c. credit sales
   d. accrued liabilities

27. From the standpoint of a creditor, a high debt/equity ratio would be viewed as
   a. favorable, as it indicates that the company has a low degree of leverage.
   b. unfavorable, as it indicates that the company has a high degree of leverage.
   c. favorable, because a high ratio indicates that the company is maximizing its tax-deductible interest expense.
   d. favorable or unfavorable, depending on the size of the company.

28. Listed below are some of the line items included in XYZ Company’s financial statements:

   Revenue 5,000
   Cost of Goods Sold 2,000
   Depreciation 1,000
   Inventories 250
   Net Fixed Assets 4,000
   Long-term Debt 2,000
   Cash and Marketable Securities 500
   Accounts Receivable 350
   Accounts Payable 400
   Salaries Payable 150

   What is the amount of XYZ’s net working capital?
   a. $550
   b. $700
   c. $300
   d. $450

29. As a firm increases the amount of debt in its capital structure, the required return on the firm’s equity will
   a. increase, all other factors held constant.
   b. decrease, all other factors held constant.
   c. remain the same, all other factors held constant.
   d. sometimes increase and sometimes decrease, depending on the amount of debt added.

30. In a world with taxes, debt financing is preferred to equity financing because
   a. principal and interest payments on debt are deductible expenses for income tax purposes, while dividend payments on equity are not deductible expenses.
   b. interest payments on debt are deductible expenses for income tax purposes, while dividend payments on equity are not deductible expenses.
   c. debt payments are not contractual obligations, so if the firm’s cash flow falls, the firm can elect not to pay the interest payments due on most debts.
   d. increasing the amount of debt reduces costs and does not change the risk associated with the firm’s equity.
Appendix 4: Optional Formula Sheet

Glossary:
- **Annual Percentage Rate (APR):** Determines annual interest rates using simple interest. Rates per period are multiplied by the number of periods in a year to determine the annual rate.
- **Effective Annual Rate (EAR):** Determines annual interest rates using compound interest. Rates per period are compounded for the number of periods in a year to determine the annual rate.
- **Net Working Capital:** Current assets minus current liabilities

Formulas:
- **Present Value of a Single Sum:** $PV \times \left(1 + \frac{r}{t}\right)^N$
- **Future Value of a Single Sum:** $FV \div \left(1 + \frac{r}{t}\right)^N$
- **Present Value of an Annuity:** $PMT \times \frac{1 - (1+r)^{-N}}{r}$
- **Future Value of an Annuity:** $PMT \times \frac{(1+r)^N - 1}{r}$
- **Effective Annual Rate (EAR):** $\left(1 + \frac{r}{m}\right)^m - 1$
- **Nominal Interest Rate:** $[(1 + \text{real interest rate}) \cdot (1 + \text{expected inflation rate})] - 1$
- **Holding Period Return:** $\frac{\text{Ending Value of Investment}}{\text{Beginning Value of Investment}}$
- **Net Present Value:** $\text{Present Value of inflows} - \text{Present value of outflows}$
- **Discount rate** is the opportunity cost of capital (the rate of return on similar risk projects)

Variance = average of squared deviations around the average  
Standard Deviation = square root of variance

\[
\text{Sample Variance} = \frac{\sum (R_i - \overline{R})^2}{N - 1}
\]

\[
\text{Population Variance} = \frac{\sum (R_i - E(R))^2}{N}
\]

**CAPM Security Market Line** = Risk Free Rate + (Return on the market - Risk Free Rate) * Beta

**Bond Formula:**  
\[
\text{Price} = \frac{PMT \times \left[1 - \left(1 + \frac{r}{t}\right)^{-N}\right]}{r} + \left(1 + \frac{r}{t}\right)^{-N}
\]

**Stock Valuation Formulas:**
- **Preferred Stock Price:** $\frac{\text{Dividend}}{\text{Price}}$
- **Constant Growth Stock Price:** $D_0 \div \left(k_s - g\right)$

**Expected Return Estimates:**
- **Preferred Stock:** $k_p = \frac{\text{Dividend}}{\text{Price}}$
Common Stock:

\[ K_s = RF + (R_m - RF) B \]

\[ K_s = K_d + 5\% \]

\[ K_s = \frac{D1}{\text{Price}} + g \]

Portfolio Expected Return = \( \Sigma w_i k_i \)

Beta of Portfolio = \( \Sigma w_i \beta_i \)

Weighted-Average Cost of Capital (WACC) = \( K_d^* (w_d) + K_p (w_p) + K_s (w_s) \) where \( K_d^* = K_d (1 - T) \)