# Cost of Capital

*Second Edition*

# Workbook

**Shannon P. Pratt, CFA, FASA, MCBA**
**with Alina V. Niculita**

JOHN WILEY & SONS, INC.

# Cost of Capital Workbook

# Cost of Capital

*Second Edition*

# Workbook

**Shannon P. Pratt, CFA, FASA, MCBA**
**with Alina V. Niculita**

JOHN WILEY & SONS, INC.

This book is printed on acid-free paper.



Published by John Wiley & Sons, Inc., Hoboken, New Jersey

Published simultaneously in Canada



For more information about Wiley products, visit our web site at www.wiley.com

ISBN: 0-471-22896-6

Printed in the United States of America

10 9 8 7 6 5 4 3 2 1

# About the Authors

**Dr. Shannon P. Pratt** is a founder and a managing director of Willamette Management Associates. Founded in 1969, Willamette is one of the oldest and largest independent valuation consulting, economic analysis, and financial advisory services firms, with offices in principal cities across the United States. He is also a member of the board of directors of Paulson Capital Corp., an investment banking firm.

Over the last 35 years, Dr. Pratt has performed valuation engagements for mergers and acquisitions, employee stock ownership plans (ESOPs), fairness opinions, gift and estate taxes, incentive stock options, buy-sell agreements, corporate and partnership dissolutions, dissenting stockholder actions, damages, marital dissolutions, and many other business valuation purposes. He has testified in a wide variety of federal and state courts across the country and frequently participates in arbitration and mediation proceedings.

He holds an undergraduate degree in business administration from the University of Washington and a doctorate in business administration, majoring in finance, from Indiana University. He is a Fellow of the American Society of Appraisers, a Master Certified Business Appraiser, a Chartered Financial Analyst, a Certified Business Counselor, and a Certified Mergers and Acquisitions Advisor.

Dr. Pratt's professional recognitions include being designated a life member of the Business Valuation Committee of the American Society of Appraisers, past chairman and a life member of the ESOP Association Advisory Committee on Valuation, a life member of the Institute of Business Appraisers, the recipient of the magna cum laude in business appraisal award from the National Association of Certified Valuation Analysts, and the recipient of the Distinguished Achievement Award from the Portland Society of Financial Analysts. He served two three-year terms (the maximum) as a trustee-at-large of The Appraisal Foundation.

Dr. Pratt is author of *Business Valuation Discounts and Premiums*, *Business Valuation Body of Knowledge*, *Cost of Capital: Estimation and Applications*, 2nd edition, and *The Market Approach to Valuing Businesses* (all published by John Wiley & Sons, Inc.), and *The Lawyer's Business Valuation Handbook* (published by the American Bar Association). He is coauthor of *Valuing a Business: The Analysis and Appraisal of Closely Held Companies*, 4th edition, and *Valuing Small Businesses and Professional Practices*, 3rd edition (both published by McGraw-Hill). He is also coauthor of *Guide to Business Valuations*, 12th edition (published by Practitioners Publishing Company).

He is the editor-in-chief of the monthly newsletter *Shannon Pratt's Business Valuation Update*®. He oversees *BVLibrary.com*℠, which includes full texts of court cases, conference presentations and unpublished papers, IRS materials, restricted stock study papers, and pre-IPO study papers and data. He also oversees *Pratt's Stats*™, which is the official completed transaction database of the International Business Brokers Association, and *BVMarketData.com*℠, which includes the online version of *Pratt's Stats*™, as well as *BIZCOMPS*®, *Mergerstat/Shannon Pratt's Control Premium Study*™, *The FMV Restricted Stock Study*™, and the *Valuation Advisors's Lack of Marketability Discount Study*™.

Dr. Pratt develops and teaches business valuation courses for the American Society of Appraisers and the American Institute of Certified Public Accountants, and frequently speaks on business valuation at national legal, professional, and trade association meetings. He has also developed a seminar on business valuation for judges and lawyers.

**Alina V. Niculita** is the managing editor of *Shannon Pratt's Business Valuation Update®*. She earned her bachelor of economics in banking and finance from the Academy of Economics Studies in Bucharest, Romania, her masters in business administration from CMC Graduate School of Business in the Czech Republic, and her masters of business administration in finance from the Joseph M. Katz Graduate School of Business at the University of Pittsburgh. She is also enrolled in the departmental doctor of philosophy program in systems science/business administration at Portland State University.

# Contents

# List of Exhibits

# Preface

This workbook is designed as a hands-on practical learning experience to supplement the book *Cost of Capital: Estimation and Applications*. It is thoroughly indexed to also serve as a reference tool for any specific aspect of cost of capital.

The workbook covers every major concept presented in the second edition of *Cost of Capital*. The second edition follows the same chapter order as the first edition but covers additional material and updated material not found in the first edition.

The workbook is organized in two sections:

Section One: Questions
Section Two: Answers

The questions in Section One consist of:

- Multiple Choice Questions
- True or False Questions
- Fill-in-the-blank Questions
- Exercises

The workbook contains an exercise illustrating every computational concept presented in the book.

The answers in Section Two are supplemented by explanations where some amplification would be helpful to the reader.

Readers who use the workbook in conjunction with *Cost of Capital* may choose to work the chapters in the workbook immediately after reading each corresponding chapter in the book, or they may choose to read *Cost of Capital* in its entirety before starting the workbook. Alternatively, readers may work Parts I, II, and III of the workbook after reading each corresponding part in the book.

For definitions of terms, readers should turn to the International Glossary of Business Valuation Terms, included in the workbook as an appendix.

For those interested in earning Continuing Professional Education (CPE) credit, Section Two is followed by a 40-question self-study quiz good for eight (8) hours of CPE credit.

The workbook also will serve as a useful tool for students preparing to sit for professional exams offered by the American Society of Appraisers (ASA), which awards the Accredited Senior Appraiser designation; the American Institute of Certified Public Accountants (AICPA), which awards the Accredited in Business Valuation designation; the Institute of Business Appraisers (IBA), which awards the Certified Business Appraiser designation; the National Association of Certified Valuation Analysts (NACVA), which awards the Certified Valuation Analyst designation; the Canadian Institute of Chartered Business Valuators (CICBV), which awards the Chartered Business Valuator designation; and the Association for Investment Management and Research (AIMR®), which awards the Chartered Financial Analyst® designation.

I hope that readers will gain a deeper understanding of the concepts of cost of capital through the practical experience of applying the methods throughout this workbook.

Shannon Pratt
Portland, Oregon
E-mail: *shannonp@BVResources.com*

# Acknowledgments

This workbook has benefited enormously from review by several people with an advanced level of knowledge and experience in cost of capital and valuation. The following people reviewed the manuscript, and the workbook reflects their thoughtful consideration and comments:

Michael W. Barad
Ibbotson Associates
Chicago, Ill.

Stephen J. Bravo
Apogee Business Valuations, Inc.
Framingham, Mass.

James R. Hitchner
Phillips Hitchner Group, Inc.
Atlanta, Ga.

Ronald L. Seigneur
Seigneur & Company, P.C. CPAs
Lakewood, Colo.

In addition, I would like to thank two analysts of Willamette Management Associates who worked through all of the questions and critiqued the workbook. Their comments provided us with helpful feedback. They are:

Aaron Rotkowski
Portland, Ore.

Ilya Shulman
Chicago, Ill.

I especially thank Alina Niculita for writing Chapters 7, 8, 9, 10, 11, and 13, and for creating the index. Her significant contribution is greatly appreciated. A note of thanks, also, to *BVMarketData.com*[sm] manager Chad Phillips, CFA, of Business Valuation Resources, who contributed to Chapter 12 and also reviewed the manuscript.

A special thanks to Ibbotson Associates, whose data we relied on heavily in writing this workbook and whose unique perspective and suggestions proved invaluable.

I am very grateful for the continuing support from John Wiley & Sons, Inc., especially John DeRemigis, executive editor, Judy Howarth, associate editor, and Louise Jacob, associate managing editor.

Finally, to Tanya Hanson, project manager on this workbook, research analyst Jill Johnson, and publications department assistant Laurie Morrisey, all with Business Valuation Resources. I would like to express my thanks and appreciation for their superlative efforts.

Shannon Pratt
Portland, Oregon

# Notation System Used in This Book

A source of confusion for those trying to understand financial theory and methods is that financial writers have not adopted a standard system of notation. The following notation system is adapted from the fourth edition of *Valuing a Business: The Analysis and Appraisal of Closely Held Companies*, by Shannon P. Pratt, Robert F. Reilly, and Robert P. Schweihs (New York: McGraw-Hill, 2000).

## VALUE AT A POINT IN TIME

| | |
|---|---|
| $PV$ | = Present value |
| $FV$ | = Future value |
| $MVIC$ | = Market value of invested capital |

## COST OF CAPITAL AND RATE OF RETURN VARIABLES

| | |
|---|---|
| $k$ | = Discount rate (generalized) |
| $k_e$ | = Discount rate for common equity capital (cost of common equity capital) Unless otherwise stated, it generally is assumed that this discount rate is applicable to net cash flow available to common equity. |
| $k_{e(pt)}$ | = Cost of equity prior to tax effect |
| $k_p$ | = Discount rate for preferred equity capital |
| $k_d$ | = Discount rate for debt (net of tax effect, if any) (*Note:* For complex capital structures, there could be more than one class of capital in any of the preceding categories, requiring expanded subscripts.) |
| $k_{d(pt)}$ | = Cost of debt prior to tax effect |
| $k_{ni}$ | = Discount rate for equity capital when net income rather than net cash flow is the measure of economic income being discounted |
| $c$ | = Capitalization rate |
| $c_e$ | = Capitalization rate for common equity capital. Unless otherwise stated, it generally is assumed that this capitalization rate is applicable to net cash flow available to common equity. |
| $c_{ni}$ | = Capitalization rate for net income |
| $c_p$ | = Capitalization rate for preferred equity capital |
| $c_d$ | = Capitalization rate for debt (*Note:* For complex capital structures, there could be more than one class of capital in any of the preceding categories, requiring expanded subscripts.) |
| $t$ | = Tax rate (expressed as a percentage of pretax income) |
| $R$ | = Rate of return |
| $R_f$ | = Rate of return on a risk-free security |
| $E(R)$ | = Expected rate of return |

$E(R_m)$ = Expected rate of return on the "market" (usually used in the context of a market for equity securities, such as the New York Stock Exchange [NYSE] or Standard & Poor's [S&P] 500)
$E(R_i)$ = Expected rate of return on security *i*
$B$ = Beta (a coefficient, usually used to modify a rate of return variable)
$B_L$ = Levered beta
$B_U$ = Unlevered beta
$RP$ = Risk premium
$RP_m$ = Risk premium for the "market" (usually used in the context of a market for equity securities, such as the NYSE or S&P 500)
$RP_s$ = Risk premium for "small" stocks (usually average size of lowest quintile or decile of NYSE as measured by market value of common equity) over and above $RP_m$
$RP_u$ = Risk premium for unsystematic risk attributable to the specific company
$RP_i$ = Risk premium for the *i*th security
$K_1 \ldots K_n$ = Risk premium associated with risk factor 1 through *n* for the average asset in the market (used in conjunction with arbitrage pricing theory)
$WACC$ = Weighted averaged cost of capital

## INCOME VARIABLES

$E$ = Expected economic income (in a generalized sense; i.e., could be dividends, any of several possible definitions of cash flows, net income, etc.)
$NI$ = Net income (after entity-level taxes)
$NCF_e$ = Net cash flow to equity
$NCF_f$ = Net cash flow to the firm (to overall invested capital, or entire capital structure, including all equity and long-term debt)
$PMT$ = Payment (interest and principal payment on debt security)
$D$ = Dividends
$T$ = Tax (in dollars)
$GCF$ = Gross cash flow (usually net income plus noncash charges)
$EBT$ = Earnings before taxes
$EBIT$ = Earnings before interest and taxes
$EBDIT$ = Earnings before depreciation, interest, and taxes ("Depreciation" in this context usually includes amortization. Some writers use EBITDA to specifically indicate that amortization is included.)
$EBITDA$ = Earnings before interest, taxes, depreciation, and amortization

## PERIODS OR VARIABLES IN A SERIES

$i$ = The *i*th period or the *i*th variable in a series (may be extended to the *j*th variable, the *k*th variable, etc.)
$n$ = The number of periods or variables in a series, or the last number in a series
$\infty$ = Infinity
$0$ = $\text{Period}_0$, the base period, usually the latest year immediately preceding the valuation date

## WEIGHTINGS

$W$ = Weight
$W_e$ = Weight of common equity in capital structure
$W_p$ = Weight of preferred equity in capital structure
$W_d$ = Weight of debt in capital structure
(*Note:* For purposes of computing a weighted average cost of capital [WACC], it is assumed that preceding weightings are at market value.)

## GROWTH

$g$ = Rate of growth in a variable (e.g., net cash flow)

## MATHEMATICAL FUNCTIONS

$\sum$ = Sum of (add all the variables that follow)
$\prod$ = Product of (multiply together all the variables that follow)
$\bar{x}$ = Mean average (the sum of the values of the variables divided by the number of variables)
$G$ = Geometric mean (the product of the values of the variables taken to the root of the number of variables)

# Basic Formulas

## BASIC PRESENT VALUE FORMULA

$$PV = \frac{NCF_1}{(1+k)} + \frac{NCF_2}{(1+k)^2} + \cdots + \frac{NCF_n}{(1+k)^n}$$

where:

| | |
|---|---|
| $PV$ | = Present value |
| $NCF_1 \ldots NCF_n$ | = Net cash flow (or other measure of economic income) expected in each of the periods 1 through $n$, $n$ being the final cash flow in the life of the investment |
| $k$ | = Cost of capital applicable to the defined stream of net cash flow |

## BASIC CAPITALIZATION FORMULA

$$PV = \frac{NCF_1}{c}$$

where:

| | |
|---|---|
| $PV$ | = Present value |
| $NCF_1$ | = Net cash flow expected in the first period immediately following the valuation date |
| $c$ | = Capitalization rate |

## FORMULA FOR CONVERTING DISCOUNT RATE TO CAPITALIZATION RATE

$$c = k - g$$

where:

| | |
|---|---|
| $c$ | = Capitalization rate |
| $k$ | = Discount rate (cost of capital) for the subject investment |
| $g$ | = Expected long-term sustainable growth rate in the cash flow available to the subject investment |

## GORDON GROWTH MODEL

$$PV = \frac{NCF_0(1+g)}{k-g}$$

where:

$PV$ = Present value
$NCF_0$ = Net cash flow in period 0, the period immediately preceding the valuation date
$k$ = Discount rate (cost of capital)
$g$ = Expected long-term sustainable growth rate in net cash flow to investor

## MIDYEAR DISCOUNTING FORMULA

$$PV = \frac{NCF_1}{(1+k)^{0.5}} + \frac{NCF_2}{(1+k)^{1.5}} + \cdots + \frac{NCF_n}{(1+k)^{n-0.5}}$$

where:

$PV$ = Present value
$NCF_1 \ldots NCF_n$ = Net cash flow (or other measure of economic income) expected in each of the periods 1 through $n$, $n$ being the final cash flow in the life of the investment
$k$ = Cost of capital applicable to the defined stream of net cash flow

## MIDYEAR CAPITALIZING FORMULA

$$PV = \frac{NCF_1(1+k)^{0.5}}{k-g}$$

where:

$PV$ = Present value
$NCF_1$ = Net cash flow expected in the first period immediately following the valuation date
$k$ = Discount rate (cost of capital)
$g$ = Expected long-term sustainable growth in net cash flow

## MIDYEAR DISCOUNTING FORMULA WITH TERMINAL VALUE

$$PV = \frac{NCF_1}{(1+k)^{0.5}} + \frac{NCF_2}{(1+k)^{1.5}} + \cdots + \frac{NCF_n}{(1+k)^{n-0.5}} \frac{\dfrac{NCF_n(1+g)(1+k)^{0.5}}{k-g}}{(1+k)^n}$$

where:

$NCF_1 \ldots NCF_n$ = Net cash flow expected in each of the periods 1 through $n$, $n$ being the last period of the discrete cash flow projections
$k$ = Discount rate (cost of capital)
$g$ = Expected long-term sustainable growth rate in net cash flow, starting with the last period of the discrete projections as the base year

## WEIGHTED AVERAGE COST OF CAPITAL (WACC) FORMULA

$$WACC = (k_e \times W_e) + (k_p \times W_p) + (k_{d(pt)}[1 - t] \times W_d)$$

where:

$WACC$ = Weighted average cost of capital
$k_e$ = Cost of common equity capital
$W_e$ = Percentage of common equity in the capital structure, at market value
$k_p$ = Cost of preferred equity
$W_p$ = Percentage of preferred equity in the capital structure, at market value
$k_{d(pt)}$ = Cost of debt (pretax)
$t$ = Tax rate
$W_d$ = Percentage of debt in the capital structure, at market value

## FORMULA FOR COST OF EQUITY CAPITAL IN BUILD-UP MODEL

$$E(R_i) = R_f + RP_m + RP_s + RP_u$$

where:

$E(R_i)$ = Expected (market required) rate of return on security $i$
$R_f$ = Rate of return available on a risk-free security as of the valuation date
$RP_m$ = General equity risk premium for the "market"
$RP_s$ = Risk premium for small size
$RP_u$ = Risk premium attributable to the specific company or to the industry (the $u$ stands for unsystematic risk, as defined in Chapter 5)

An additional component may be a factor for industry risk.

## FORMULA FOR ARITHMETIC MEAN

$$\bar{x} = \frac{\sum_{n}^{1} R_i}{n}$$

where:

$\bar{x}$ = Mean average
$R_i$ = Return for the $i$th period (the returns measured for each period are actually excess returns, that is, the difference between the equity market return and the Treasury obligation income return for the period)
$n$ = Number of observation periods

## FORMULA FOR GEOMETRIC MEAN

$$G = \left[\prod_{n}^{1}(1+R_i)\right]^{\frac{1}{n}} - 1$$

Sometimes also written as:

$$G = \sqrt[n]{\prod_{n}^{1}(1+R_i)} - 1$$

where:

$G$ = Geometric average
$R_i$ = Return for the $i$th period (the returns measured for each period are actually excess returns, that is, the difference between the equity market return and the Treasury obligation income return for the period)
$n$ = Number of observation periods

## BASIC CAPITAL ASSET PRICING MODEL (CAPM) FORMULA

$$E(R_i) = R_f + B(RP_m)$$

where:

$E(R_i)$ = Expected return (cost of capital) for an individual security
$R_f$ = Rate of return available on a risk-free security (as of the valuation date)
$B$ = Beta
$RP_m$ = Equity risk premium for the market as a whole (or, by definition, the equity risk premium for a security with a beta of 1.0)

## EXPANDED CAPM COST OF CAPITAL FORMULA

$$E(R_i) = R_f + B(RP_m) + RP_s + RP_u$$

where:

$E(R_i)$ = Expected rate of return on security $i$
$R_f$ = Rate of return available on a risk-free security as of the valuation date
$RP_m$ = General equity risk premium for the market
$RP_s$ = Risk premium for small size
$RP_u$ = Risk premium attributable to the specific company ($u$ stands for unsystematic risk)
$B$ = Beta

## FORMULA FOR COMPUTING UNLEVERED BETA

This is the formula to go from a levered capital structure to the beta that would be assumed for an unlevered capital structure (100% equity).

$$B_u = \frac{B_L}{1 + (1 - t)W_d / W_e}$$

where:

$B_u$ = Beta unlevered
$B_L$ = Beta levered
$t$ = Tax rate for the company
$W_d$ = Percent debt in the capital structure
$W_e$ = Percent equity in the capital structure

## FORMULA FOR COMPUTING RELEVERED BETA

$$B_L = B_u(1 + (1 - t)W_d/W_e)$$

where the definitions of the variables are the same as in the formula for computing unlevered betas

## FORMULA FOR ESTIMATING COST OF CAPITAL BY THE SINGLE-STAGE DCF MODEL

$$k = \frac{NCF_0(1 + g)}{PV} + g$$

where:

$PV$ = Present value
$NCF_0$ = Net cash flow in period 0, the period immediately preceding the valuation date
$k$ = Discount rate (cost of capital)
$g$ = Expected long-term sustainable growth rate in net cash flow to investor

## FORMULA FOR ESTIMATING COST OF EQUITY CAPITAL BY THE MULTISTAGE DCF MODEL

$$PV = \sum_{n=1}^{5} \frac{[NCF_0(1 + g_1)^n]}{(1 + k)^n} + \sum_{n=6}^{10} \frac{[NCF_5(1 + g_2)^{n-5}]}{(1 + k)^n} + \frac{\dfrac{NCF_{10}(1 + g_3)}{k - g_3}}{(1 + k)^{10}}$$

where:

| | |
|---|---|
| $NCF_0$ | = Net cash flow (or dividend) in the immediately preceding year |
| $NCF_5$ | = Expected net cash flow (or dividend) in the fifth year |
| $NCF_{10}$ | = Expected net cash flow (or dividend) in the tenth year |
| $g_1$, $g_2$, and $g_3$ | = Expected growth rates in NCF (or dividends) through each of stages 1, 2, and 3, respectively |
| $k$ | = Cost of capital (discount rate) |

# Section One
# Questions

## Part I
## Cost of Capital Basics

# Chapter 1

# Defining Cost of Capital

This chapter presents a variety of concepts about the nature of cost of capital and how it is measured.

## MULTIPLE CHOICE QUESTIONS

1. Cost of capital usually is expressed:

   a. In percentage terms, as a percentage of the face value of the investment.

   b. In percentage terms, as a percentage of the amount invested.

   c. In dollar terms, in real dollars.

   d. In dollar terms, in nominal dollars.

2. The components of a company's capital structure include:

   a. Accounts payable, long-term debt, and preferred stock.

   b. Accounts payable, preferred stock, and common stock.

   c. Accounts payable, long-term debt, and common stock.

   d. Long-term debt, preferred stock, and common stock.

3. Cost of capital for an acquisition or a project is a function of:

   a. The company's marginal overall cost of capital.

   b. The company's average overall cost of capital.

   c. The company's marginal cost of equity capital.

   d. The investment (the use to which the capital is put).

4. Which of the following items are referred to as the "time value of money"?

   a. The expected "real" rate of return, expected inflation, and risk.

   b. The expected "real" rate of return and expected inflation but not risk.

c. Expected inflation and risk but not the expected "real" rate of return.

d. The expected "real" rate of return and risk but not expected inflation.

5. Which of the following is a correct statement?

a. Cost of capital is based on market value and usually is stated in real terms.

b. Cost of capital is based on book value and usually is stated in real terms.

c. Cost of capital is based on market value and usually is stated in nominal terms.

d. Cost of capital is based on book value and usually is stated in nominal terms.

6. Which of the following terms are often (properly) interchangeable?

a. Cost of capital, discount rate, and required rate of return.

b. Cost of capital and discount rate but not required rate of return.

c. Cost of capital and required rate of return but not discount rate.

d. Required rate of return and discount rate but not cost of capital.

7. Which of the following is used as a divisor to convert a single element of return to an estimate of present value?

a. Cost of capital.

b. Discount rate.

c. Capitalization rate.

d. Required rate of return.

## TRUE OR FALSE QUESTIONS

8. Cost of capital is market driven. True False

9. Cost of capital is based on historical returns. True False

10. The discount rate is the link that equates expected future returns for the life of the investment with the present value of the investment at a given date. True False

# Chapter 2

# Introduction to Cost of Capital Applications: Valuation and Project Selection

This chapter discusses using the cost of capital as the discount rate in valuation and project selection. It gives the present value formula and an example of applying it to estimate the value of a bond. It discusses briefly the relationship between a discount rate and a capitalization rate.

## MULTIPLE CHOICE QUESTIONS

1. For valuation and capital investment project selection, what is the measure of economic income on which most analysts today prefer to focus?

   a. Net cash flow.

   b. Net income.

   c. EBIT.

   d. EBITDA.

2. If a company's overall cost of capital is 10%, and a project the company is considering is riskier than the average of the company's overall risk, the rate at which the expected returns from the project should be discounted would be:

   a. Less than 10%.

   b. 10%.

   c. More than 10%.

   d. The rate that the proposed project manager recommends.

3. The *discount rate* represents:

   a. The reciprocal of the price/net cash flow ratio.

   b. The total expected rate of return.

c. The current yield on the investment.

d. The reciprocal of the capitalization rate.

## TRUE OR FALSE QUESTIONS

4. The procedure for using cost of capital to evaluate an acquisition is basically similar to the procedure used for project selection. True False

5. Cost of capital is used to convert expected future returns to present value. True False

## FILL-IN-THE-BLANK QUESTIONS

6. Net cash flow is also referred to as:

_____

7. A yield rate used to convert a single payment or measure of economic income into a present value is called:

_____

## EXERCISES

Given the following:

| | |
|---|---|
| Face value of bond: | $1,000 |
| Interest rate on face value: | 7% |
| Bond pays interest once a year, at end of year. | |
| Bond matures, from valuation date: | 4 years |
| Market yield on bonds of comparable risk and other characteristics as of valuation date: | 10% |

8. Compute the value of this bond at the valuation date.

9. What is the company's embedded cost of capital for this bond?

10. What is the company's market cost of capital for debt such as this?

# Chapter 3

# Net Cash Flow: The Preferred Measure of Return

This chapter defines net cash flow, both to equity and to invested capital, and explains why it is considered the preferred measure of return for valuation and capital budgeting. It also states that the estimates of net cash flow should be probability-weighted expected values and shows how to calculate them.

## MULTIPLE CHOICE QUESTIONS

1. Which of the following must be subtracted from EBITDA to compute net cash flow to invested capital?

   a. Depreciation, interest (tax-affected), capital expenditures, and additions to working capital.

   b. Depreciation, capital expenditures, and addition to working capital but not interest.

   c. Capital expenditures, additions to working capital, and interest (tax-affected) but not depreciation.

   d. Capital expenditures and additions to working capital, but neither depreciation nor interest.

2. The net cash flows that theoretically should be discounted in future periods are:

   a. The most likely outcomes.

   b. Amounts based on extrapolation of historical net cash flows.

   c. The probability-weighted expected values.

   d. The most conservative estimates of net cash flows.

## TRUE OR FALSE QUESTIONS

3. In a symmetrical distribution of possible outcomes, the cash flow most likely to occur is the expected value of the probability distribution. True False

4. Net cash flow is the amount of money available to be distributed without disrupting the projected ongoing operations of the enterprise. True False

5. Net cash flow is the economic income measure for which we have the best historical data available for estimating cost of equity capital. True False

## EXERCISES

Use the following balance sheet and income statement for questions 6 and 7.

**Old Stable Consulting Co.**
**Balance Sheet as of 12/31/XX**

| Assets | |
|---|---|
| Current Assets | $1,000,000 |
| Furniture, fixtures, & equipment (net of depreciation) | 500,000 |
| Total Assets | $1,500,000 |

| Liabilities and Equity | |
|---|---|
| Accounts payable | 200,000 |
| Current portion of long-term debt | 100,000 |
| Total current liabilities | $300,000 |
| Long-term debt | 400,000 |
| Stockholders' equity | 800,000 |
| Total liabilities and equity | $1,500,000 |

**Old Stable Consulting Co.**
**Income Statement for Year Ending 12/31/XX**

| | | |
|---|---|---|
| Revenue | | $9,000,000 |
| Cost of direct labor | | 3,600,000 |
| Gross margin | | 5,400,000 |
| General & administrative expenses: | | |
| Depreciation | $100,000 | |
| Other G&A | 3,700,000 | 3,800,000 |
| Operating profit | | $1,600,000 |
| Interest expense | | 50,000 |
| Pretax income | | $1,550,000 |
| Corporate income taxes (federal and state) | | 620,000 |
| Net income | | $930,000 |

Assume the following:

Target working capital: 8% of last year's revenue
Expected capital expenditures: $120,000

6. Compute the net cash flow to equity.

7. Compute the net cash flow to invested capital.

8. Given the following distribution of possible outcomes (unrelated to questions 6 and 7), compute the expected value (probability-weighted value):

| | |
|---|---|
| –$100 | 10% |
| 0 | 20% |
| +$100 | 40% |
| +$150 | 20% |
| +$200 | 10% |

9. What is the most likely outcome of the above distribution?

# Chapter 4

# Discounting versus Capitalizing

Chapter 2 briefly introduced the present value formula, which is at the heart of the discounting method, while this chapter presents the capitalization method. The reason the discounting method was presented first, even though the capitalization method is simpler, is that the capitalization method is merely a shortcut version of the discounting method. The student should have a firm understanding of the discounting method to intelligently determine whether results produced by the capitalization method are within a reasonable range of value.

This chapter presents the functional relationship between discounting and capitalizing and a formula for converting a discount rate to a capitalization rate if certain assumptions are met. It also introduces the Gordon Growth Model. It shows how discounting and capitalization models can be combined by using a capitalization model for the "terminal value" in a discounting model.

Finally, the chapter introduces the "midyear convention," which assumes that cash flows are realized more or less evenly throughout the year rather than at the end of the year.

## MULTIPLE CHOICE QUESTIONS

1. Which of the following statements is true about the discount rate?

   a. It is the reciprocal of the capitalization rate.

   b. It represents the total compound rate of return that an investor in that class of investment expects to achieve over the life of the investment.

   c. It represents the current yield.

   d. Both (b) and (c) are true.

2. Which of the following statements is true about the relationship between discount and capitalization rates?

   a. The discount rate equals the capitalization rate only for an investment whose returns are growing at a constant rate over time.

   b. The discount rate and the capitalization rate are terms that are properly used interchangeably.

   c. The discount rate equals the capitalization rate only when the expected returns in each period are equal in perpetuity.

   d. The discount rate never equals the capitalization rate.

3. Which of the following is a correct statement?

   a. In discounting, changes in expected returns are reflected in the numerator, while in capitalizing, changes in expected returns after the first year are reflected in the denominator.

   b. In discounting, changes in expected returns are reflected in the denominator, while in capitalizing, changes in expected returns after the first year are reflected in the numerator.

   c. In both discounting and capitalizing, changes in expected returns after the first year are reflected in the numerator.

   d. In both discounting and capitalizing, changes in expected returns after the first year are reflected in the denominator.

4. If the expected rate of growth is constant in perpetuity, which of the following is a correct statement about the relationship between the discounting and capitalizing models?

   a. The discounting model would be expected to produce a higher value than the capitalizing model.

   b. The discounting model would be expected to produce the same value as the capitalizing model.

   c. The discounting model would be expected to produce a lower value than the capitalizing model.

   d. Not enough information is provided to determine what the relationship would be.

5. Which of the following is a correct statement about the midyear convention versus the year-end convention?

   a. The midyear convention always produces a higher value than the year-end convention.

   b. The year-end convention always produces a higher value than the midyear convention.

   c. The midyear and year-end conventions produce the same value only when the cash flows are the same in every year.

   d. Sometimes the midyear convention produces a higher value and sometimes the year-end convention produces a higher value, depending on the pattern of the cash flows.

## TRUE OR FALSE QUESTIONS

6. In the discounting model, the terminal value is discounted for $n + 1$ periods. True False

7. In the discounting model, the longer the discrete projection period, the greater the impact of the terminal value on the total present value. True False

8. When the midyear convention is used in the discounting model for the discrete cash flows, it is appropriate to use it for the terminal value as well. True False

## FILL-IN-THE-BLANK QUESTIONS

9. The procedure by which the latest year's actual return is increased by a constant rate of growth and the result is divided by a capitalization rate is called:

_____

10. The capitalization value of expected cash flows after the discrete projection period is called:

_____

## EXERCISES

11. Given the following:

    A noncallable perpetual preferred stock
    Pays $10 dividend per share at the end of each year
    Market yield rate for preferred stocks of similar risk: 8%

    Value the stock by the capitalization formula.

12. Given the following:

    | | |
    |---|---|
    | Discount rate | 10% |
    | Growth rate in perpetuity | 4% |

    What is the capitalization rate?

13. Given the following:

    | | |
    |---|---|
    | Dividend in base period ($period_0$) | $1.00 |
    | Growth rate in dividend (compounded annually in perpetuity) | 5% |
    | Discount rate | 12% |

    Using the Gordon Growth Model, what is the value of one share of stock?

14. Given the following:

| Net Cash Flows | |
|---|---|
| Year 1: | $1000 |
| Year 2: | $1200 |
| Year 3: | $1400 |
| Year 4: | $1550 |
| Year 5: | $1700 |

Growth in perpetuity beyond year 5: 6%
Discount rate: 20%

Compute the present value using the year-end discounting convention.

15. Given the same set of facts as in Exercise 13, compute the present value by the midyear capitalization convention.

16. Given the same set of facts as in Exercise 14, compute the present value by the midyear discounting convention.

# Chapter 5

# Relationship between Risk and the Cost of Capital

This chapter defines risk and gives the three types of risk in the economic sense as used in the conventional methods of estimating cost of capital. It also tells us that as risk goes up, the cost of capital goes up. Finally, it tells us that common equity capital, preferred equity capital, and debt are components of total invested capital and that the blended cost of these is the weighted average cost of capital (WACC).

## MULTIPLE CHOICE QUESTIONS

1. The cost of capital is comprised of which of the following factors?

   a. The "risk-free rate," plus a holding period premium, plus a premium for risk.

   b. The "risk-free rate," plus a premium for potential changes in interest rates, plus a premium for risk.

   c. The "risk-free rate," plus a maturity premium, plus a premium for risk.

   d. The "risk-free rate," plus a premium for risk.

2. "Unsystematic risk" encompasses all of the following EXCEPT:

   a. Industry risk.

   b. Company-specific risk.

   c. The risk of changes in the general level of market returns.

   d. Risk arising from leverage.

3. In which of the following methods of estimating the cost of equity capital is a risk premium explicitly added to a risk-free rate?

   a. The build-up method, the Capital Asset Pricing Model, and the DCF method.

   b. The build-up method and the Capital Asset Pricing Model but not the DCF method.

   c. The build-up method and the DCF method but not the Capital Asset Pricing Model.

   d. The Capital Asset Pricing Model and the DCF method but not the build-up method.

4. The risk-free rate:

   a. Excludes any type of risk.

   b. Excludes the risk of default, but not the risk of changes in interest rates.

   c. Excludes the risk of default, but not the risk of changes in the general prices of equities in the market.

   d. Excludes the risk of default, the risk of changes in interest rates, and the risk of changes in the general prices of equities in the market.

## TRUE OR FALSE QUESTIONS

5. Arguably, the most widely accepted definition of risk in the context of business appraisal is "the degree of uncertainty as to the realization of expected future economic income." True False

6. As risk increases, the cost of capital increases, and vice versa. True False

7. Uncertainty is in the minds of investors; therefore, we cannot measure it directly. True False

## FILL-IN-THE-BLANK QUESTIONS

8. In an economic sense, as used in the conventional sense of estimating the cost of capital, capital theory divides risk into what three components?

   _____

   _____

   _____

9. What is the name of the factor commonly used to measure systematic risk?

   _____

10. The overall cost of a company's capital (blended cost of common equity, preferred equity, and long-term debt) is called what?

    _____

# Chapter 6

# Cost Components of a Company's Capital Structure

In the last chapter, it was said that the weighted average cost of capital (WACC) is the blended cost of the components of the capital structure. In this chapter we explore each of those components.

## MULTIPLE CHOICE QUESTIONS

1. The relevant market "yield" in calculating the cost of debt is:

   a. Yield to maturity, yield-to-call date, or current yield.

   b. Yield to maturity or yield-to-call date but not current yield.

   c. Yield to maturity or current yield but not yield-to-call date.

   d. Current yield or yield-to-call date but not yield to maturity.

2. In estimating the after-tax cost of debt for a potential new project, the best rate to use is usually:

   a. The current marginal rate.

   b. The marginal rate over the life of the investment.

   c. The average statutory rate.

   d. The average effective rate.

3. In the late 1990s in the sale of small businesses and professional practices with at least 30% down, what was the typical percentage of the balance that insurance companies were charging to the buyer to guarantee the seller paper?

   a. 1%

   b. 3%

   c. 5%

   d. 6% or more

## TRUE OR FALSE QUESTIONS

4. Some companies, especially smaller ones, use short-term debt as if it were long-term debt. In such cases, it is a legitimate exercise of the analyst's judgment to reclassify the short-term debt as long-term debt. True False

5. Research shows that the majority of corporations do not pay the marginal statutory tax rate. True False

## FILL-IN-THE-BLANK QUESTIONS

6. The major components of capital structure are:

_____

_____

_____

7. In addition to the major components of capital structure, list five other possible variations of securities in a company's capital structure:

_____

_____

_____

_____

_____

8. The cost of convertible debt or preferred stock can be analyzed as a combination of what two elements?

_____

_____

9. What are the two components of return on common stock or partnership interests?

_____

_____

## EXERCISE

10. If a company's pretax cost of debt is 8% and the applicable tax rate is 20%, what is the company's after-tax cost of debt?

# Chapter 7

# Weighted Average Cost of Capital

This chapter tests concepts such as when to use the weighted average cost of capital (WACC), how to compute WACC for both public and private companies, and what capital structure is appropriate in different valuation scenarios.

## MULTIPLE CHOICE QUESTIONS

1. All of the following statements about the use of WACC are true EXCEPT:

   a. The most obvious instance in which to use WACC is when valuing the entire capital structure of a company.

   b. WACC is commonly used in discounting or capitalizing returns to common equity holders.

   c. Sometimes WACC is used to value the entire capital structure and then subtract the market value of debt to estimate the value of equity.

   d. WACC is especially appropriate for project selection in capital budgeting.

2. Which of the following is appropriate to use as the after-tax cost of debt for a public company with bonds issued and outstanding?

   a. The coupon rate on the face value of the bonds.

   b. The current yield on the market value of the bonds.

   c. The yield to maturity of the bonds.

   d. None of the above.

## TRUE OR FALSE QUESTIONS

3. If a minority interest is valued by first valuing the overall capital and then subtracting debt, then a hypothetical capital structure (e.g., an industry-average capital structure) may be used in the calculation of WACC. True False

4. The cost of capital may be greater for a private company than for a public company, even though they are in the same industry and are the same size, because the private company may not have equivalent access to the capital markets. True False

## FILL-IN-THE-BLANK QUESTIONS

5. The relative weightings of debt and equity or other capital components used in calculating the WACC for a company are based on the _____ values of each component, not on the _____ values.

6. The weighted average cost of capital (WACC) is based on the cost of each capital component _____ of any corporate-level tax effect on that component.

7. One of the processes used to estimate market value weights for the capital structure of a private company is an _____ one.

8. Assuming that the book value of equity is lower than its market value, then using the capital structure weightings at book values tends to _____ the WACC and _____ the value of equity.

## EXERCISES

The following are known about public Company XYZ:

4 million shares of common stock issued and outstanding
Closing common stock price per share: $10
2 million shares of preferred stock issued and outstanding
Closing preferred stock price per share: $16
$10 million face value of bonds issued and outstanding
Closing bond price: 80 (80% of face value)
Cost of common equity for XYZ: 25%
Cumulative, nonparticipating dividend on the preferred stock: $2.40 per share every year
Cost of debt before tax effect: 10%
Combined federal and state income tax rate: 40%

9. The cost of preferred equity for Company XYZ is:

   a. 24%

   b. 15%

   c. 9%

   d. 14.4%

10. The after-tax cost of debt for Company XYZ is:

    a. 4%

    b. 10%

    c. 9%

    d. 6%

11. Compute the market value of invested capital (MVIC) and the weights for each capital structure component for Company XYZ.

12. The WACC for Company XYZ is:

    a. 19.5%

    b. 17.1%

    c. 19.1%

    d. 18.9%

13. Given the following:

| | |
|---|---|
| Pretax cost of debt | 10% |
| Cost of preferred stock | 9% |
| Cost of common equity | 20% |
| Shares of common stock | 1,000,000 |
| Price per share of common stock | $7.00 |
| Shares of preferred stock | 500,000 |
| Price per share of preferred stock | $4.50 |
| Face value of debt (same as market value) | $3,000,000 |
| Tax rate | 30% |

    Compute the WACC.

# PART II
# Estimating the Cost of Equity Capital

# Chapter 8

# Build-up Models

This chapter reviews the inputs to the build-up model for estimating the cost of common equity capital.

## MULTIPLE CHOICE QUESTIONS

1. The typical build-up model for estimating the cost of common equity capital may consist of all of the following components EXCEPT:

   a. A risk-free rate.

   b. Beta.

   c. A general equity risk premium.

   d. A size premium.

2. The risk-free rate component of the build-up model reflects which of the following components?

   I. Rental rate.

   II. Inflation.

   III. Default risk.

   IV. Maturity or investment risk.

      a. I, II, III

      b. I, III, IV

      c. II, III, IV

      d. I, II, IV

3. Which of the following are reasons why financial analysts prefer the 20-year U.S. Treasury yield to maturity as the risk-free rate in the build-up method?

   I. It approximates the assumption of perpetuity for an equity investment.

   II. Shorter-term rates fluctuate less than longer-term rates.

   III. Longer-term yields fluctuate less than shorter-term ones.

   IV. Longer-term yields contain maturity risk.

   a. I, II, III

   b. I, III, IV

   c. II, III, IV

   d. I, II, IV

4. All of the following are factors that may impact company-specific risk EXCEPT:

   a. Volatility of returns

   b. General equity risk premium

   c. Leverage

   d. Size smaller than the smallest size premium group

## TRUE OR FALSE QUESTIONS

5. U.S. Treasury obligations with maturities of 1, 10, and 20 years typically are used to represent the risk-free rate in the build-up model for estimating the cost of equity capital. True False

6. The view that the long-term arithmetic average equity risk premium is the best proxy for today's equity risk premium is universally accepted. True False

7. An alternative to using the historical average equity risk premium data (Ibbotson data) to estimate the current equity risk premium is the discounted cash flow method. True False

8. It is empirically proven that the degree of risk and the cost of capital increase with decreasing company size. True False

## FILL-IN-THE-BLANK QUESTIONS

9. The differential in expected return on the broad stock market over U.S. Treasury obligations is called _____ .

10. A common method of estimating the equity risk premium is to use _____ data.

11. Mathematically, the geometric mean is always _____ than the arithmetic mean, unless all observations are _____ .

12. The cost of equity capital can be regarded as composed of two major components: a _____ rate and a _____ premium.

13. When applying the build-up method in an international setting, a country _____ _____ may be added to reflect uncertainties in the particular country.

14. The risk-free rate component of the build-up model for estimating the cost of equity _____ include inflation.

## EXERCISES

The following are annual returns on the stock market (as measured by a broad market index) and on short-term U.S. Treasury obligations for five consecutive years.

| Year | Returns on the Market | Returns on U.S. Treasury Obligations |
|---|---|---|
| 1 | 43% | 3% |
| 2 | 15% | 6% |
| 3 | 20% | 2% |
| 4 | –30% | 5% |
| 5 | 2% | 6% |

15. Compute the short-term arithmetic mean equity risk premium over the five years of data given.

16. Compute the short-term geometric mean risk premium over the five years of data given.

17. Use the build-up method to calculate the cost of equity capital for Company XYZ using the following known variables:

| | |
|---|---|
| Risk-free rate | 6% |
| Equity risk premium | 7% |
| Size premium for Company XYZ | 8% |
| Company-specific risk premium | 2% |

# Chapter 9

# Capital Asset Pricing Model

Despite many criticisms, the Capital Asset Pricing Model (CAPM) is still widely used to estimate the cost of equity capital, especially for large companies. This chapter reviews the inputs to CAPM, differentiates between systematic and unsystematic risk, and presents an expanded CAPM.

## MULTIPLE CHOICE QUESTIONS

1. Compared to the traditional CAPM model, the expanded CAPM model includes which of the additional following factors?

   a. Beta and the general equity risk premium for the market.

   b. Risk-free rate, risk premium for small size, and company-specific risk.

   c. Risk premium for small size and company-specific risk premium.

   d. Risk-free rate, beta, and the general equity risk premium for the market.

2. A stock that pays no dividends has a beta of 1.4 and the market is down 10%. The beta for the market is considered to be equal to 1.0. According to CAPM, the price of the stock will be expected to:

   a. Be up 14%.

   b. Be up 10%.

   c. Be down 10%.

   d. Be down 14%.

3. A stock that pays no dividends has a beta of 0.75 and the market is down 10%. The beta for the market is considered to be equal to 1.0. According to CAPM, the price of the stock is expected to:

   a. Be down 7.5%.

   b. Be up 7.5%.

   c. Be up 10%.

   d. Be down 10%.

4. The risk that CAPM assumes is diversified away by investors holding well-diversified portfolios is:

   a. Systematic risk.

   b. Investment risk.

   c. Default risk.

   d. Unsystematic risk.

5. The equity risk premium for a security equals:

   a. The security's beta times a general equity risk premium for the market as a whole.

   b. The beta for the market as a whole times a general equity risk premium for the market as a whole.

   c. The risk-free rate plus the product of the security's beta and the general equity risk premium for the market as a whole.

   d. The security's beta or systematic risk.

6. The unsystematic risk of an investment in a particular company is a function of:

   I. The characteristics of the industry.

   II. The characteristics of the company.

   III. The systematic risk of the investment.

   IV. The type of investment interest.

      a. I, II, III

      b. I, II, IV

      c. II, III, IV

      d. I, III, IV

7. Beta measures:

   a. Unsystematic risk.

   b. The general equity risk premium.

   c. Systematic risk.

   d. The specific (company) equity risk premium.

## TRUE OR FALSE QUESTIONS

8. Generally, for a security, a higher beta signifies higher systematic risk and results in a higher estimated equity risk premium and cost of equity capital. True False

9. Since privately held companies have no market price, their betas can be directly observed and measured. True False

10. A fundamental assumption of CAPM is that investors do not require compensation for the systematic risk because they can easily diversify it away. True False

11. For a security with a beta lower than 1.0, when market rates of return move up or down, the rates of return for the subject security tend to move in the opposite direction and with lower magnitude. True False

## FILL-IN-THE-BLANK QUESTIONS

12. One difference between the build-up method and CAPM is the introduction of _____ as a modifier to the general risk premium.

13. _____ measures the sensitivity of excess total returns on any individual security to the total excess returns on some measure of the market, such as the New York Stock Exchange (NYSE) Composite Index or the Standard & Poor's (S&P) 500 Index.

14. CAPM concludes that the equity risk premium for a security is a linear function of the security's _____ .

15. For a security with a beta higher than 1.0, when market rates of return move up or down, the rates of return for the subject security tend to move in the _____ direction and with _____ magnitude.

## EXERCISES

The following are known:

| | |
|---|---|
| Risk-free rate as of the valuation date ($R_f$): | 6% |
| Beta for security XYZ ($B$): | 1.5 |
| Equity risk premium for the market as a whole ($RP_m$): | 8% |

16. Compute the equity risk premium for security XYZ.

17. Compute the expected return (cost of capital) for security XYZ based on CAPM.

18. The expected return in excess of the risk-free rate for security ABC is 12% and the equity risk premium for the market as a whole is 8%. Compute the beta for security XYZ.

# Chapter 10

# Proper Use of Betas

This chapter focuses on beta estimation methodology in the context of the Capital Asset Pricing Model (CAPM). Topics to master in this chapter include the differences between systematic and unsystematic risk, the factors that impact the beta measurement process, and how to compute levered and unlevered betas. The chapter also introduces some methodologies employed by Ibbotson Associates in the calculation of its betas.

## MULTIPLE CHOICE QUESTIONS

1. If betas for all guideline companies are not available from one source, the best solution is to use:

   a. For each guideline company, an average beta computed from all betas available from all sources.

   b. For each guideline company, the most conservative value offered by various sources.

   c. The source providing betas for the greatest number of guideline companies and do not use betas for the others.

   d. For each guideline company, the median beta from all betas provided by various sources.

2. Which of the following is NOT one of the steps in adjusting for leverage differences between the public guideline companies and the subject private company?

   a. Compute unlevered betas for guideline companies.

   b. Compute an arithmetic average of the levered betas of the public guideline companies.

   c. Decide where the subject company's risk would fall relative to guideline companies, assuming all had 100% equity capital structures.

   d. Relever the beta for the subject company on the basis of one or more assumed capital structures.

## TRUE OR FALSE QUESTIONS

3. The unlevered beta for a highly leveraged company could be highly underestimated if the levered beta was measured over a period of low or no leverage. True False

4. Beta is a modifier to the equity risk premium in the build-up model and in CAPM to estimate cost of equity capital. True False

5. The length of the total period over which returns are measured is not a factor that has considerable influence on the beta measurement. True False

6. The process of estimating a levered beta for a private company involves computing an average levered beta for the guideline companies from published beta values and then levering it again with the capital structure of the subject private company. True False

## FILL-IN-THE-BLANK QUESTIONS

7. There is empirical evidence that, over time, a company's beta tends toward its _____ average beta.

8. Levered betas reflect two risk factors: _____ risk and _____ risk.

9. For a leveraged company, unlevered beta is always _____ than the levered beta.

10. The Ibbotson (adjusted) beta calculated by Ibbotson Associates is computed by a technique called _____ .

11. Beta can be computed by using either _____ or _____ returns on the individual security and on the market. Ibbotson uses _____ returns in all its computations.

12. For computing beta, the Ibbotson Associates *Beta Book* uses _____ months for most stocks. If data is not available for this length of time, then data for _____ months is used as the minimum acceptable.

13. Betas for publicly traded stocks that reflect the capital structure of the companies are referred to as _____ betas.

## EXERCISES

14. We know the following about Company ABC:

| | |
|---|---|
| Unlevered beta: | 1.25 |
| Debt: | $75 million |
| Equity: | $25 million |
| Tax rate: | 40% |

Compute the levered beta for Company ABC.

15. We know the following about private Company XYZ:

| | |
|---|---|
| Unlevered beta: | 0.50 |
| Levered beta: | 1.40 |
| Tax rate: | 40% |
| Total market value of capital: | $100 million |

What is the market value of the equity for Company XYZ?

# Chapter 11

# Size Effect

This chapter tests basic concepts about the size premium and about Ibbotson Associates' methodology for computing it. The topic is explored further in Chapter 13, "Using Ibbotson Associates Cost of Capital Data."

## MULTIPLE CHOICE QUESTIONS

1. The size premium as calculated by Ibbotson Associates is supposed to be used in which of the following models to estimate the cost of equity capital?

   a. CAPM only.

   b. The build-up model only.

   c. Both CAPM and the build-up model.

   d. None of the above.

2. The size premium as calculated by Ibbotson Associates equals:

   a. The product of beta and the arithmetic mean return minus the CAPM-estimated return in excess of the riskless rate.

   b. The product of beta and the arithmetic mean return minus the realized return in excess of the riskless rate.

   c. The realized return minus the CAPM-estimated return.

   d. The realized return in excess of the riskless rate minus the CAPM-estimated return in excess of the riskless rate.

## TRUE OR FALSE QUESTIONS

3. CAPM makes no distinction between the general equity risk premium for the market as a whole and the equity risk premium for a specific security. True False

4. The Ibbotson Associates studies and the Standard & Poor's Corporate Value Consulting (S&P CVC) studies on the size effect cover the same size categories over the same period of time and thus yield similar results. True False

## FILL-IN-THE-BLANK QUESTIONS

5. The size effect refers to the general idea that smaller size is associated with _____ risk and, therefore, with _____ cost of capital.

6. The smallest decile in the Ibbotson Associates analysis of the size effect is the _____ decile.

## EXERCISES

The following are known about the 10th decile of a market:

| | |
|---|---|
| Realized return in excess of the riskless rate: | 16% |
| CAPM-estimated return in excess of the riskless rate: | 11% |
| Beta: | 1.5 |
| Risk-free rate: | 6% |

7. Compute the size premium according to the methodology employed by Ibbotson Associates.

8. Compute the general equity risk premium for the market as a whole.

9. Compute the equity risk premium for the 10th decile, according to CAPM.

10. Compute the CAPM-estimated return for the 10th decile.

11. Given the risk-free rate of 6% and the general equity risk premium for the market as computed in question 9, what should beta for the 10th decile be for CAPM to be accurate?

# Chapter 12

# Discounted Cash Flow Method of Estimating Cost of Capital

The discounted cash flow (DCF) method of estimating the cost of capital is so named because it rearranges the DCF formula so the present value is known and the cost of capital is the unknown. It uses the current market prices of stocks along with dividends and analysts' growth estimates to get an implied cost of capital.

## MULTIPLE CHOICE QUESTIONS

1. Which of the following is a correct statement about the DCF method of estimating the cost of capital?

   a. It can only be applied directly to private companies.

   b. It can only be applied directly to public companies.

   c. It can be applied directly to either public or private companies.

   d. It cannot be applied directly to either public or private companies.

2. The cost of capital estimates by the DCF method:

   a. Represent the company's overall cost of capital (WACC).

   b. Represent the equity risk premium.

   c. Represent the entire cost of equity.

   d. Represent the risk-free rate and the equity risk premium but not the size effect.

3. Which of the following is NOT an assumption of the DCF method of estimating the cost of capital?

   a. The company's current stock price embodies the market's expectation of the rate of return that will be realized by investing in that stock.

   b. The company's current stock price is actually the sum of the present values of the expected returns to the investors (dividends and stock price change).

c. The company's current stock price is equal to its expected future returns discounted to a present value at a discount rate that represents the cost of equity capital for that company.

d. Rational investors seek to hold efficient portfolios, that is, portfolios that are fully diversified.

## TRUE OR FALSE QUESTIONS

4. A weakness of the DCF method of estimating the cost of capital is that most published estimates come from "buy-side" stock analysts, which may be biased. True False

5. Most multistage DCF models for estimating the cost of capital are more reliable than single-stage models. True False

## FILL-IN-THE-BLANK QUESTIONS

6. What are the two main types of models used to implement the DCF method as it is applied to estimating cost of capital?

_____

_____

7. What is a published source of industry average costs of equity capital that are based on the DCF model?

_____

## EXERCISES

8. Given the following about Company ABC:

| | |
|---|---|
| Dividend latest 12 months: | $1.00 per year |
| Analysts' growth estimate: | 5% |
| Stock price: | $10.00 per share |

Estimate ABC's cost of equity capital using the single-stage DCF model.

9. You have been asked to estimate the cost of equity capital for public Company XYZ. In the course of your research, you observe that analysts following Company XYZ estimate that it will grow at 7.0% over the next five years. Furthermore, the growth rate estimate for Company XYZ's industry is expected to approximate 10.7% over the next 10 years, which you can use for the second stage (years 6 through 10) of the DCF method. Provided that long-term macroeconomic growth should approximate 6.5%, XYZ's current stock price of $61.70, and an annual dividend of $1.60 (assuming a constant dividend payout ratio), calculate XYZ's cost of equity capital using a multistage DCF model.

# Chapter 13

# Using Ibbotson Associates Cost of Capital Data

This chapter gives an overview of the various Ibbotson Associates publications useful in the estimation of cost of capital with emphasis on its benchmark publication, *Stocks, Bonds, Bills and Inflation® (SBBI) Valuation Edition Yearbook*. Topics to master in this chapter are: the types of data available in each of Ibbotson's publications; the accepted uses of data within the models for estimating the cost of equity; the methodologies Ibbotson uses to derive its data; and, finally, the applicability of the data in specific valuation situations.

## MULTIPLE CHOICE QUESTIONS

### *SBBI Classic and Valuation Editions*

1. The most commonly used models for estimating the cost of equity capital are:

   a. The build-up method and the Capital Asset Pricing Model (CAPM).

   b. The Fama-French three-factor model and the discounted cash flow (DCF) model.

   c. The build-up method and the DCF model.

   d. CAPM and the DCF model.

2. The build-up method and CAPM are very similar, with the major exception of:

   a. The risk-free rate.

   b. The equity risk premium.

   c. The firm size premium.

   d. Beta.

3. The "size effect" or "size phenomenon" refers to the fact that:

   a. Different risk-free rates exist for large versus small companies.

   b. Historically, small stocks have shown greater risk and greater return than large stocks.

   c. Large companies usually have a higher cost of equity than small companies.

   d. Historically, small stocks have shown greater risk and lower return than large stocks.

4. The method for computing the firm size premium (measuring the size effect) currently employed by Ibbotson Associates is:

   a. The difference between Ibbotson Small Company stock series returns and the Standard & Poors (S&P) 500 Index total returns.

   b. The difference between Ibbotson Small Company stock series returns and the New York Stock Exchange (NYSE) total returns.

   c. The difference between Ibbotson Small Company stock series returns and the returns for each of the 10 deciles of the NYSE.

   d. The actual return in excess of what CAPM predicts given the beta for a decile, otherwise known as the beta-adjusted premium.

5. The micro-cap size group is a consolidation of which of the following ranges of deciles?

   a. Deciles 1 and 2.

   b. Deciles 3 through 5.

   c. Deciles 6 through 8.

   d. Deciles 9 and 10.

6. The low-cap size group is a consolidation of which of the following ranges of deciles?

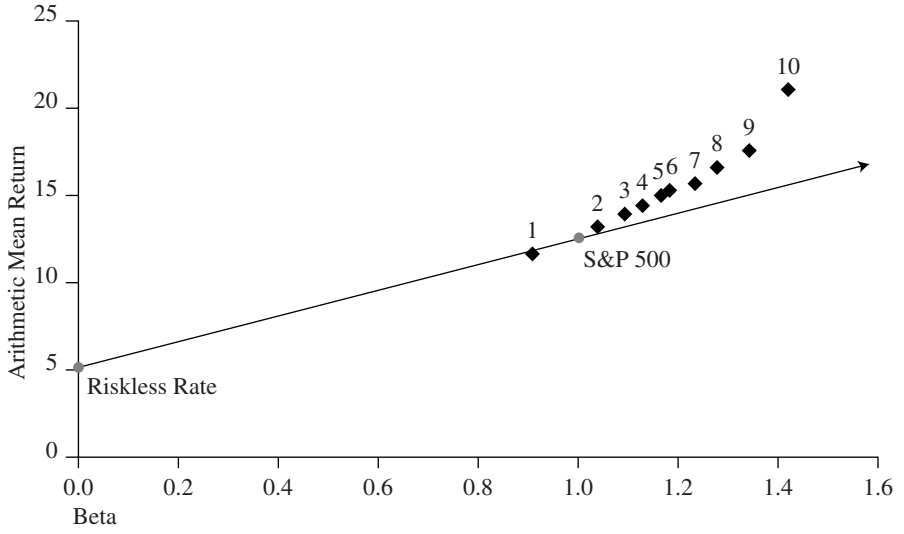
   a. Deciles 1 and 2.

   b. Deciles 3 through 5.

   c. Deciles 6 through 8.

   d. Deciles 9 and 10.

**Exhibit 13.1** Security Market Line versus Size-Decile Portfolios of the NYSE/AMEX/NASDAQ (1926–2000)




*Source: Stocks, Bonds, Bills and Inflation® Valuation Edition 2001 Yearbook*, © 2001 Ibbotson Associates, Inc. Used with permission. All rights reserved.

**Questions 7, 24, and 25 refer to Exhibit 13.1.**

7. Exhibit 13.1 supports the existence of a firm size premium by showing that:

   a. As companies get smaller, their beta and CAPM-predicted return increase.

   b. As companies get smaller, their beta and CAPM-predicted return decrease.

   c. The full return of small companies is not fully explained by CAPM, and that a size premium must be added.

   d. Both (a) and (c).

8. Ibbotson's position on the use of the firm size premium in connection with CAPM and the build-up method is that:

   a. The beta-adjusted size premium is appropriate for application only in CAPM because the beta-adjusted premia are construed in the context of CAPM.

   b. The beta-adjusted size premium is appropriate for application in CAPM without an industry adjustment and in build-up models in conjunction with other premia, including an industry adjustment.

c. The beta-adjusted size premium is appropriate to use only in the build-up model.

d. The non–beta-adjusted size premium is appropriate to use in the build-up model because the build-up method does not include a beta.

9. The most common way of arriving at the expected equity risk premium is by:

a. Measuring the historical relationship of small stocks to large stocks.

b. Comparing the historical yields of long-term bonds to short-term notes and bills.

c. Measuring the difference in performance of a market aggregate over time.

d. Measuring the historical relationship of stocks to U.S. government obligations.

10. The long-term government bond rate used in the computation of the equity risk premium is typically most appropriate for business valuation purposes because (select the *best* answer):

a. The data are readily available in daily financial publications such as *The Wall Street Journal*.

b. The longer-term yields usually are higher than the short-term ones, leading to a more conservative equity risk premium estimate.

c. Ibbotson chose the long-term rate because its equity risk premium calculations start as far back as 1926.

d. Because most companies do not have a defined life span, they usually are valued as going concerns with indefinite lives.

11. The long-term equity risk premium is calculated by Ibbotson Associates as:

a. The geometric average total return on the S&P 500 less the geometric average income return on long-term Treasury bonds, using annual data for the last 30 years.

b. The arithmetic average total return on the S&P 500 less the arithmetic average income return on long-term Treasury bonds, using annual data from 1926 to the present.

c. The arithmetic average total return on the S&P 500 less the arithmetic average total return on long-term Treasury bonds, using annual data from 1926 to the present.

d. The arithmetic average total return on the S&P 500 less the arithmetic average income return on long-term Treasury bonds, using annual data for the last 30 years.

12. Exponential weighting of historical data is a method that places:

a. Higher weighting on more important events in the past.

b. Lower weighting on less important events in the past.

c. Higher weighting on the present and recent past.

d. No weighting on extreme events.

## *Beta Book*

13. All of the following are conditions a company must meet to be included in the Ibbotson Associates *Beta Book* EXCEPT:

    a. The company must have a beta lower than 1.5.

    b. The company must have sales greater than $100,000 in the most recent year.

    c. The company must have at least 36 months of return data.

    d. The company must have a market capitalization greater than $10,000 for the most recent month.

14. Beta, the systematic risk for a company or a decile, is used in all of the following calculations EXCEPT:

    a. The build-up method to estimate the cost of equity capital.

    b. The Fama-French three-factor model to estimate the cost of equity.

    c. CAPM to estimate the cost of equity.

    d. The CAPM-predicted return in the calculation of the size premium by decile of NYSE/AMEX/NASDAQ.

15. In the context of CAPM, a beta of 1.0 for a company means that:

    a. The company's estimated cost of equity is equal to the returns on the risk-free asset.

    b. CAPM is unable to predict a meaningful result given the imperfect data available.

    c. When the stock market goes down by a certain percentage, the company's return goes up by the same amount.

    d. The expected movement in return on an equity investment in the company is equal to that of the market.

16. Beta can be characterized as all of the following EXCEPT:

    a. Company-specific, unsystematic risk in CAPM.

    b. The slope of the best fit line between the (excess) return on the individual security and the (excess) return on the market.

c. The modifier of the equity risk premium in CAPM.

d. A measure of the sensitivity of the movement in returns on a particular stock to movement in returns on some measure of the market.

17. All the following methods can be used to find a proxy for a beta for a private company EXCEPT:

a. Using an average beta for the industry as provided in the Ibbotson Associates *Cost of Capital Yearbook.*

b. Selecting specific guideline public companies and using some composites such as the median or average of their betas as provided in the Ibbotson Associates *Beta Book.*

c. Using a peer group beta as illustrated in the Ibbotson Associates *Beta Book.*

d. Regressing readily available excess returns on the private company against excess returns on the market.

18. Which of the following are true about the industry risk premia data developed by Ibbotson Associates and included in the *SBBI Valuation Edition*?

I. CAPM has the ability to incorporate industry risk into the beta measure.

II. For the build-up method, it is possible to incorporate industry risk into a company-specific premium.

III. The non–beta-adjusted size premium is more appropriate than the simple excess returns size premium to use in conjunction with an industry premium.

IV. The method Ibbotson uses for its industry risk premia relies on the full information beta estimation process.

a. I, II, III

b. I, III, IV

c. I, II, IV

d. II, III, IV

## TRUE OR FALSE QUESTIONS

### *SBBI Classic and Valuation Editions*

19. Readily available empirical data sources exist for betas of private companies. True False

20. In the Ibbotson Associates publications for valuation analysts, there is no distinction in meaning, computation methodologies, or applications between the "size premium" (beta-adjusted size premium) and the "small stock premium" (non–beta-adjusted premium). True False

21. The 10th decile used in the calculations of the size premium is the decile formed by the companies with the highest market capitalization (the top decile). True False

22. A stock's market capitalization is calculated as the number of shares of stock outstanding times the price per share of stock. True False

23. 10a and 10b refer to the breakout of the 10th decile into two components. True False

Exhibits 13.1 and 13.2 show the actual returns achieved by the 10 deciles and the security market line on which CAPM would predict the decile portfolios would fall.

24. The fact that most of the decile portfolios fall above the security market line depicts (graphically) that the smaller the decile, the higher the returns in excess of the CAPM-predicted return. True False

**Exhibit 13.2** Long-term Returns in Excess of CAPM Estimation for Decile Portfolios of the NYSE/AMEX/NASDAQ (1926–2000)

| Decile | Beta* | Arithmetic Mean Return | Realized Return in Excess of Riskless Rate** | Estimated Return in Excess of Riskless Rate*** | Size Premium (Return in Excess of CAPM) |
|---|---|---|---|---|---|
| 1-Largest | 0.91 | 12.06% | 6.84% | 7.03% | –0.20% |
| 2 | 1.04 | 13.58% | 8.36% | 8.05% | 0.31% |
| 3 | 1.09 | 14.16% | 8.93% | 8.47% | 0.47% |
| 4 | 1.13 | 14.60% | 9.38% | 8.75% | 0.62% |
| 5 | 1.16 | 15.18% | 9.95% | 9.03% | 0.93% |
| 6 | 1.18 | 15.48% | 10.26% | 9.18% | 1.08% |
| 7 | 1.24 | 15.68% | 10.46% | 9.58% | 0.88% |
| 8 | 1.28 | 16.60% | 11.38% | 9.91% | 1.47% |
| 9 | 1.34 | 17.39% | 12.17% | 10.43% | 1.74% |
| 10-Smallest | 1.42 | 20.90% | 15.67% | 11.05% | 4.63% |
| Mid-Cap, 3–5 | 1.12 | 14.46% | 9.23% | 8.65% | 0.58% |
| Low-Cap, 6–8 | 1.22 | 15.75% | 10.52% | 9.45% | 1.07% |
| Micro-Cap, 9–10 | 1.36 | 18.41% | 13.18% | 10.56% | 2.62% |

*Betas are estimated from monthly portfolio total returns in excess of the 30-day U.S. Treasury bill total return versus the S&P 500 total returns in excess of the 30-day U.S. Treasury bill, January 1926-December 2000.

**Historical riskless rate is measured by the 75-year arithmetic mean income return component of 20-year government bonds (5.22 percent)

***Calculated in the context of the CAPM by multiplying the long-horizon equity risk premium by beta. The equity risk premium is estimated by the annual arithmetic mean total return of the S&P 500 (12.98 percent) minus the annual arithmetic mean income return component of 20-year government bonds (5.22 percent) from 1926–2000.

*Note that all data has been rounded for presentation purposes and any calculation discrepancies are due to rounding.*

*Source: Stocks, Bonds, Bills, and Inflation® Valuation Edition 2001 Yearbook*, © 2001 Ibbotson Associates, Inc. Used with permission. All rights reserved.

25. The fact that the returns for the largest companies fall below the security market line may be a sign that the CAPM overestimates the returns on these stocks. True False

26. The expected equity risk premium is defined as the additional return investors expect to receive to compensate for the additional risk associated with investing in equities as opposed to riskless assets. True False

27. The equity risk premium as a forward-looking measure of what investors can expect in the market is directly observable in the market. True False

28. For the purposes of computing the equity risk premium, the total return on the chosen Treasury security is riskless because both its income return and its net gain/loss from its sale are riskless. True False

29. Ibbotson Associates provides equity risk premium estimates for the short-, intermediate-, and long-term horizons. True False

30. Ibbotson Associates uses the last 30 years of data for the purpose of computing the long-horizon equity risk premium. True False

31. The equity risk premium preferred by Ibbotson Associates is a geometric average risk premium, as opposed to an arithmetic average risk premium. True False

## *Beta Book*

32. The *Beta Book* provides cost of equity estimates for more than 5,000 companies. True False

33. The difference between the levered and the unlevered beta is that the unlevered beta excludes the business risk of a company and only reflects its financial risk. True False

34. The Ibbotson (adjusted) beta calculated in the *Beta Book* using the Vasicek Shrinkage Technique is based on the theory that, in time, a company's beta tends toward its industry-average beta. True False

35. The peer group betas as calculated by Ibbotson Associates can be helpful either for comparison purposes or in place of a company beta displaying poor regression results. True False

36. Individual company betas, adjusted betas, Ibbotson betas, and peer group betas are different names for one type of beta included in the Ibbotson *Beta Book*. True False

## FILL-IN-THE-BLANK QUESTIONS

### *SBBI Classic and Valuation Editions*

37. The _____ is the market benchmark most used throughout Ibbotson publications because it represents a large sample of companies across a large sample of industries.

38. Ibbotson Associates uses the income return on the _____ as the benchmark for the riskless asset in computing the long-horizon equity risk premium.

39. In Ibbotson's view, _____ averages are better forward-looking point estimates, and _____ averages are better for historical analysis of a defined date range.

40. The _____ method for estimating the equity risk premium consists of interviewing academics, money managers, or other professionals about the expected direction of the market.

41. The _____ model estimates the equity risk premium by looking at what the economy can supply in the future as opposed to its historical performance.

42. The higher the standard error of the beta company estimate, the _____ the weight assigned to the company beta in the Vasicek Shrinkage Technique to calculate the Ibbotson (adjusted) beta.

43. The Ibbotson (adjusted) beta is calculated using the Vasicek shrinkage technique, which takes the statistically weighted average of the _____ beta and the _____ beta.

44. The _____, _____, and _____ are components shared by both the build-up method and CAPM to calculate the cost of equity capital.

45. All of the risk premium statistics presented in any Ibbotson Associates publication are derived from returns after _____ taxes but before _____ taxes.

46. The *Cost of Capital Yearbook* from Ibbotson Associates presents statistics such as cost of equity, cost of capital, capital structure ratios, growth rates, industry multiples, and other financial data for over 300 _____.

## EXERCISES

### *Beta Book*

47. Chapter 13 explains how Ibbotson Associates calculates its peer group beta in the *Beta Book*.

    Using the same procedure, calculate the peer group beta for Company A that has sales in four different SIC codes as follows:

| SIC Code | % Sales in Industry | Industry OLS Beta |
|---|---|---|
| 15 | 25.00 | 0.60 |
| 30 | 14.75 | 1.10 |
| 31 | 60.00 | 0.70 |
| 67 | 0.25 | 0.40 |

48. Using the following inputs, calculate the Ibbotson (adjusted) beta for Company XYZ:

| | |
|---|---|
| Peer group beta: | 1.25 |
| XYZ Company beta: | 1.75 |

The statistical significance of the XYZ beta is quite low, resulting in a 0.20 weight.

49. Given the following known variables, calculate the expected industry risk premium (IRP) for industry XYZ:

| | |
|---|---|
| Full information beta for industry XYZ: | 0.90 |
| Expected equity risk premium: | 7.8% |

What can be said about industry XYZ's riskiness compared with the market?

50. Given the following known variables, calculate the pretax capitalization rate for Company XYZ:

| | |
|---|---|
| After-tax capitalization rate for Company XYZ: | 15% |
| Tax rate for Company XYZ: | 35% |

## *Cost of Capital Yearbook*

**Questions 51–56 refer to Exhibit 13.3.**

51. The sample page (Exhibit 13.3) from the Ibbotson Associates *Cost of Capital Yearbook* presents each statistic in the following forms: Median, SIC Composite, Large Composite, and Small Composite. You are valuing a private Company, XYZ, in SIC code 275 with the following sales and total capital figures:

| Last Year | Million |
|---|---|
| Sales | $10 |
| Total capital | $8 |

Which of the forms for the statistics (Medium, SIC Composite, Large Composite, Small Composite) reported on this page are you likely to use Company XYZ for and why?

52. You are trying to estimate a cost of equity capital for Company XYZ in question 51 by looking at what comparable companies in the industry have done. What numbers in Exhibit 13.3 are you more likely to look at and why?

53. You are trying to compute the WACC for Company XYZ. After analysis you have concluded that XYZ has a cost of equity of 20% and a cost of debt after tax of 10%. Use data reported in Exhibit 13.3 to estimate the WACC for Company XYZ.

54. Using the price/sales multiples shown in Exhibit 13.3, estimate the market capitalization for Company XYZ. (Remember that Company XYZ had sales of $10 million.)

55. Calculate the cost of equity for Company XYZ given the following known variables and data reported in Exhibit 13.3:

| | |
|---|---|
| Risk-free rate | = 5.6% |
| General equity risk premium for the market as a whole | = 7.8% |

56. Assuming that you know the debt/equity ratio of Company XYZ to be 1.25 and the tax rate to be 40%, use the appropriate unlevered beta for the industry in Exhibit 13.3 and relever it to reflect XYZ's capital structure.

**Questions 57 and 58 refer to Exhibit 13.4.**

57. Using the raw beta and the Ibbotson beta, calculate the cost of equity under the CAPM for OCTEL Corp. (use $R_f = 5.6\%$; $RP_m = 7.8\%$).

58. Using the information presented for OCTEL Corp., calculate the weight assigned to the raw beta in order to calculate the adjusted Ibbotson beta.

**Exhibit 13.3** Sample Page from the 2001 *Cost of Capital Yearbook*

# STATISTICS FOR SIC CODE 275

## Commercial Printing

This Industry Comprises 12 Companies

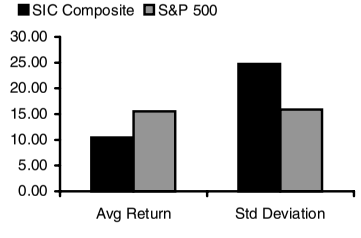
### Industry Description

Establishments primarily engaged in commercial printing by the lithographic process and in gravure printing.

| **Sales** (million$) | |
|---|---|
| Total | 9,425 |
| Average | 785.4 |
| **Three Largest Companies** | |
| DONNELLEY (R R) & SONS CO | 5,764.3 |
| BANTA CORP | 1,537.7 |
| BOWNE & CO INC | 1,010.8 |
| **Three Smallest Companies** | |
| GEOGRAPHICS INC | 27.3 |
| LASER MASTER INTL INC | 17.5 |
| DIMENSIONAL VISIONS GRP LTD | 1.0 |

| **Total Capital** (million$) | |
|---|---|
| Total | 6,061 |
| Average | 505.1 |
| **Three Largest Companies** | |
| DONNELLEY (R R) & SONS CO | 4,161.8 |
| BANTA CORP | 830.4 |
| CONSOLIDATED GRAPHICS INC | 429.1 |
| **Three Smallest Companies** | |
| SUCCESSORIES INC | 18.5 |
| LASER MASTER INTL INC | 11.5 |
| DIMENSIONAL VISIONS GRP LTD | 1.1 |

### SIC vs. S&P 500 for Last 10 Years (%)




### Number of Companies & Total Capital (billion$)

| S&P Debt Rating | Large Cap | Mid Cap | Low Cap | Micro Cap | Totals | |
|---|---|---|---|---|---|---|
| **AAA, AA, A** | 0 | 1 | 0 | 0 | 1 | (companies) |
| | 0.0 | 4.2 | 0.0 | 0.0 | 4.2 | (capital) |
| **BBB** | 0 | 0 | 0 | 0 | 0 | |
| | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | |
| **BB, B, CCC, CC, D** | 0 | 0 | 0 | 0 | 0 | |
| | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | |
| **Not Rated** | 0 | 0 | 2 | 9 | 11 | |
| | 0.0 | 0.0 | 1.2 | 0.7 | 1.9 | |
| **Totals** | 0 | 1 | 2 | 9 | 12 | |
| | 0.0 | 4.2 | 1.2 | 0.7 | 6.1 | |

### Annualized Statistics for Last 10 Years (%)

| | Avg Return | Std Deviation |
|---|---|---|
| S&P 500 | 15.50 | 15.86 |
| SIC Composite | 10.46 | 24.72 |
| Large Composite | 8.85 | 25.29 |
| Small Composite | 20.75 | 102.82 |

### Compound Annual Equity Return (%)

| | 5 Years | 10 Years |
|---|---|---|
| 75th Percentile | 6.02 | 6.51 |
| Median | -1.26 | 4.74 |
| 25th Percentile | -29.89 | 2.85 |
| SIC Composite | 3.61 | 6.12 |
| Large Composite | 0.71 | 6.03 |
| Small Composite | -10.16 | NMF |

### Sales, Income & Market Capitalization (billion$)

| | Sales | Operating Income | Net Income | Equity Capital | Debt Capital |
|---|---|---|---|---|---|
| Current Yr. | 9.4 | 1.3 | 0.4 | 4.4 | 1.6 |
| Last Yr. | 8.2 | 1.3 | 0.4 | 3.9 | 1.7 |
| 2 Yrs. Ago | 7.7 | 1.2 | 0.4 | 6.3 | 1.4 |
| 3 Yrs. Ago | 7.1 | 1.1 | 0.3 | 8.7 | 1.5 |
| 4 Yrs. Ago | 8.5 | 1.0 | -0.1 | 7.0 | 1.7 |

**Growth Over Last 5 Years** (%)

| | Net Sales | Operating Income | Net Income |
|---|---|---|---|
| Median | 17.97 | 6.07 | -2.26 |
| SIC Composite | 2.54 | 1.45 | 1.86 |
| Large Composite | 0.99 | -0.94 | -1.62 |
| Small Composite | 19.08 | 9.58 | -35.20 |

**Capital Structure Ratios** (%)

| | Debt/Total Capital | | Debt/MV Equity | |
|---|---|---|---|---|
| | Latest | 5-Year Avg | Latest | 5-Year Avg |
| Median | 28.56 | 24.17 | 39.98 | 31.87 |
| SIC Composite | 22.22 | 19.67 | 28.57 | 24.49 |
| Large Composite | 23.24 | 19.58 | 30.27 | 24.35 |
| Small Composite | 46.81 | 43.68 | 88.01 | 77.55 |

**Distribution of Sales & Total Capital** (million$)

| | Distribution of Sales | | Total Capital | |
|---|---|---|---|---|
| | Latest | 5-Year Avg | Latest | 5-Year Avg |
| 90th Percentile | 1,485.0 | 1228.2 | 790.3 | 847.7 |
| 75th Percentile | 721.4 | 401.7 | 419.8 | 535.1 |
| Median | 98.8 | 83.7 | 44.9 | 63.5 |
| 25th Percentile | 46.5 | 44.0 | 18.5 | 30.4 |
| 10th Percentile | 18.5 | 15.1 | 12.2 | 14.6 |

**Margins** (%)

| | Operating Margin | | Net Margin | | Asset Turnover | | Return on Inv. Cap. | | Return on Assets | | Return on Equity | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Latest | 5-Year Avg | Latest | 5-Year Avg | Latest | 5-Year Avg | Latest | 5-Year Avg | Latest | 5-Year Avg | Latest | 5-Year Avg |
| Median | 10.04 | 8.85 | 3.01 | 2.71 | 150.73 | 138.57 | 5.56 | 5.40 | 4.13 | 3.97 | 9.08 | 5.31 |
| SIC Composite | 13.64 | 14.34 | 4.40 | 3.58 | 150.83 | 135.88 | 8.09 | 6.87 | 6.63 | 4.86 | 9.01 | 4.57 |
| Large Composite | 13.44 | 14.51 | 4.25 | 3.57 | 155.14 | 136.09 | 9.28 | 7.08 | 6.60 | 4.86 | 8.39 | 4.67 |
| Small Composite | 6.57 | -2.64 | -0.50 | -13.48 | 114.22 | 95.77 | -1.88 | -15.78 | -0.57 | -12.91 | -0.76 | -22.75 |

**Equity Valuation Ratios** (Multiples)

| | Price/Earnings | | Market/Book | | Price/Sales | | Price/Cash Flow | | Price/Operating Income | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Latest | 5-Year Avg | Latest | 5-Year Avg | Latest | 5-Year Avg | Latest | 5-Year Avg | Latest | 5-Year Avg |
| Median | 11.02 | 18.84 | 1.27 | 2.08 | 0.36 | 0.68 | 9.47 | 18.01 | 3.27 | 4.52 |
| SIC Composite | 11.10 | 16.47 | 1.60 | 2.39 | 0.49 | 0.78 | 8.66 | 19.69 | 3.58 | 5.46 |
| Large Composite | 11.91 | 15.72 | 1.82 | 2.40 | 0.51 | 0.77 | 9.49 | 19.02 | 3.77 | 5.28 |
| Small Composite | NMF | NMF | 0.70 | 1.92 | 0.66 | 0.59 | 11.26 | NMF | 9.99 | NMF |

**Dividend Yield** (% of Price)

| | Latest | 5-Year Avg |
|---|---|---|
| Median | 0.00 | 0.00 |
| SIC Composite | 3.20 | 2.12 |
| Large Composite | 3.41 | 2.35 |
| Small Composite | 0.00 | 0.00 |

**Growth Rates** (%)

| | Analysts' Estimate |
|---|---|
| Median | 11.63 |
| SIC Composite | 11.63 |
| Large Composite | 11.44 |
| Small Composite | 11.63 |

**Cost of Equity Capital** (%)

| | CAPM | CAPM + Size Prem | 3-Factor Fama-French | Discounted Cash Flow 1-Stage | Discounted Cash Flow 3-Stage |
|---|---|---|---|---|---|
| Median | 9.79 | 11.32 | 13.96 | 11.63 | 14.40 |
| SIC Composite | 10.03 | 11.10 | 15.93 | 11.87 | 17.30 |
| Large Composite | 9.93 | 10.51 | 15.97 | 11.98 | 17.20 |
| Small Composite | 10.16 | 12.78 | 14.56 | 11.63 | 6.50 |

**Weighted Average Cost of Capital** (%)

| | CAPM | CAPM + Size Prem | 3-Factor Fama-French | Discounted Cash Flow 1-Stage | Discounted Cash Flow 3-Stage |
|---|---|---|---|---|---|
| Median | 9.80 | 11.62 | 13.27 | 11.81 | 13.11 |
| SIC Composite | 9.77 | 10.57 | 14.19 | 11.15 | 15.22 |
| Large Composite | 9.66 | 10.10 | 14.26 | 11.22 | 15.20 |
| Small Composite | 11.02 | 12.08 | 12.80 | 11.61 | 9.53 |

**Levered Betas**

| | Raw Beta | Adjusted Beta |
|---|---|---|
| Median | 0.55 | 0.54 |
| SIC Composite | 0.61 | 0.57 |
| Large Composite | 0.61 | 0.56 |
| Small Composite | 0.95 | 0.59 |

**Unlevered Betas**

| | Adjusted Beta |
|---|---|
| Median | 0.27 |
| SIC Composite | 0.46 |
| Large Composite | 0.47 |
| Small Composite | 0.26 |

**Exhibit 13.4** Sample Page from the *Beta Book,* Second 2001 Edition

Ibbotson Associates' Beta Book


| | | CAPM: Ordinary Least Squares | | | | |
|---|---|---|---|---|---|---|
| | | Levered | | | | |
| Ticker | Company | Raw Beta | t-Stat | R-Sqr | Pr Grp Beta | Ibbotson Beta |
| OTL | OCTEL CORP* | **0.44** | 1.11 | 0.03 | 0.66 | **0.46** |
| OCLR | OCULAR SCIENCES INC* | **0.56** | 1.20 | 0.03 | 0.79 | **0.60** |
| OCN | OCWEN FINANCIAL CORP* | **0.85** | 2.20 | 0.08 | 0.97 | **0.86** |
| ODETA | ODETICS INC -CL A | **1.22** | 1.92 | 0.06 | 1.77 | **1.34** |
| ODWA | ODWALLA INC | **-0.13** | -0.32 | 0.00 | 0.58 | **-0.05** |
| ODP | OFFICE DEPOT INC | **1.30** | 3.26 | 0.16 | 0.92 | **1.26** |
| OMX | OFFICEMAX INC | **1.11** | 3.03 | 0.14 | 0.93 | **1.09** |
| OLOG | OFFSHORE LOGISTICS | **0.97** | 2.49 | 0.10 | 0.99 | **0.97** |
| OGE | OGE ENERGY CORP | **0.02** | 0.14 | 0.00 | 0.12 | **0.02** |
| OGLE | OGLEBAY NORTON CO | **0.49** | 1.73 | 0.05 | 0.58 | **0.50** |
| OCAS | OHIO CASUALTY CORP | **0.60** | 1.88 | 0.06 | 0.75 | **0.61** |
| OVBC | OHIO VALLEY BANC CORP | **0.08** | 0.55 | 0.01 | 0.97 | **0.10** |
| ODC | OIL DRI CORP AMERICA | **0.26** | 1.06 | 0.02 | 1.02 | **0.30** |
| OLGR | OILGEAR CO | **0.06** | 0.18 | 0.00 | 1.60 | **0.19** |
| ODFL | OLD DOMINION FREIGHT | **0.00** | 0.01 | 0.00 | 0.66 | **0.03** |
| OLDB | OLD NATIONAL BANCORP | **0.56** | 3.22 | 0.15 | 0.97 | **0.57** |
| ORI | OLD REPUBLIC INTL CORP | **0.52** | 2.16 | 0.07 | 0.75 | **0.53** |
| OSBC | OLD SECOND BANCORP INC/IL | **0.19** | 1.30 | 0.03 | 0.97 | **0.21** |
| OLN | OLIN CORP | **0.69** | 2.10 | 0.07 | 0.90 | **0.71** |
| OLY | OLYMPIC CASCADE FINL | **1.23** | 1.92 | 0.06 | 1.84 | **1.37** |
| ZEUS | OLYMPIC STEEL INC | **0.24** | 0.57 | 0.01 | 0.79 | **0.30** |
| OMG | OM GROUP INC | **0.62** | 2.90 | 0.13 | 0.66 | **0.62** |
| OMEF | OMEGA FINL CORP | **0.36** | 2.28 | 0.08 | 0.97 | **0.38** |
| OHI | OMEGA HEALTHCARE INVS INC | **0.75** | 2.06 | 0.07 | 0.30 | **0.71** |
| OME | OMEGA PROTEIN CORP* | **0.60** | 0.99 | 0.03 | 0.58 | **0.60** |
| OMM | OMI CORP* | **0.65** | 0.86 | 0.02 | 0.81 | **0.70** |
| OMNI | OMNI ENERGY SERVICES CORP* | **-0.59** | -0.65 | 0.01 | 0.87 | **-0.03** |
| 3ZONE | OMNI NUTRACEUTICALS INC | **-0.07** | -0.07 | 0.00 | 0.65 | **0.24** |
| 3ORXR | OMNI RAIL PRODUCTS INC | **-0.19** | -0.25 | 0.00 | 0.83 | **0.12** |
| OUSCD | OMNI USA INC | **0.99** | 1.50 | 0.04 | 1.41 | **1.10** |
| OCR | OMNICARE INC | **0.81** | 1.78 | 0.05 | 0.90 | **0.82** |
| OMC | OMNICOM GROUP | **1.00** | 5.50 | 0.34 | 1.74 | **1.01** |
| OMTL | OMTOOL LTD* | **2.32** | 2.63 | 0.13 | 1.74 | **2.11** |
| ASGN | ON ASSIGNMENT INC | **0.66** | 1.92 | 0.06 | 1.74 | **0.74** |
| ONCO | ON COMMAND CORP* | **0.64** | 1.61 | 0.04 | 1.40 | **0.72** |
| 3ONST | ON STAGE ENTERTAINMENT INC* | **0.31** | 0.19 | 0.00 | 0.75 | **0.59** |
| ONTC | ON TECHNOLOGY CORP | **2.46** | 2.71 | 0.11 | 1.74 | **2.19** |
| ONSS | ON-SITE SOURCING INC* | **0.04** | 0.07 | 0.00 | 1.61 | **0.38** |
| OLP | ONE LIBERTY PROPERTIES INC | **0.10** | 0.92 | 0.01 | 0.30 | **0.10** |
| ONPR | ONE PRICE CLOTHING STORES | **0.10** | 0.19 | 0.00 | 1.10 | **0.28** |
| 3ONCL | ONECLASS SYNERGY CORP | **-3.33** | -1.47 | 0.04 | 0.79 | **-0.07** |
| OCQ | ONEIDA LTD | **0.57** | 1.57 | 0.04 | 0.55 | **0.57** |
| OKE | ONEOK INC | **0.42** | 1.83 | 0.05 | 0.30 | **0.41** |
| 3OGAM | ONLINE GAMING SYS LTD | **1.56** | 1.94 | 0.06 | 1.74 | **1.62** |
| 3ONSE | ONSITE ENERGY CORP -CL A | **-1.25** | -1.06 | 0.02 | 0.66 | **-0.29** |

OCTEL CORP*

*Source: Beta Book* Second 2001 Edition, © 2001 Ibbotson Associates, Inc. Used with permission. All rights reserved.

**Exhibit 13.4** (Continued)

Second 2001 Edition
Data Through June 2001

| Unlevered | | Fama-French Three-Factor Model | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Raw Beta | Ibbotson Beta | FF Beta | FF t-Stat | SMB Prem | SMB t-Stat | HML Prem | HML t-Stat | FF R-Sqr |
| 0.29 | 0.22 | 0.79 | 1.93 | 1.58 | 3.29 | 3.45 | 9.63 | 0.16 |
| 0.56 | 0.59 | 1.02 | 2.12 | 1.75 | 3.07 | 4.59 | 10.39 | 0.15 |
| 0.69 | 0.63 | 1.18 | 2.86 | 1.03 | 2.06 | 3.39 | 8.48 | 0.15 |
| 0.85 | 0.77 | 0.61 | 1.03 | 3.18 | 4.40 | -6.54 | -11.20 | 0.33 |
| -0.13 | -0.05 | -0.13 | -0.31 | 2.81 | 5.32 | -0.24 | -0.57 | 0.11 |
| 1.09 | 1.01 | 1.46 | 3.52 | 3.46 | 6.87 | 1.39 | 3.43 | 0.26 |
| 0.88 | 0.76 | 1.45 | 3.98 | 4.18 | 9.47 | 3.21 | 9.02 | 0.31 |
| 0.71 | 0.61 | 0.98 | 2.28 | -1.07 | -2.04 | 0.22 | 0.53 | 0.11 |
| 0.01 | 0.01 | 0.18 | 1.29 | -0.45 | -2.57 | 1.73 | 12.42 | 0.25 |
| 0.28 | 0.13 | 0.80 | 2.80 | 3.02 | 8.66 | 2.99 | 10.64 | 0.22 |
| 0.50 | 0.48 | 0.72 | 2.02 | 0.23 | 0.53 | 1.17 | 3.36 | 0.07 |
| 0.06 | 0.06 | 0.13 | 0.76 | 0.14 | 0.72 | 0.45 | 2.79 | 0.01 |
| 0.18 | 0.15 | 0.57 | 2.21 | 1.32 | 4.20 | 3.11 | 12.25 | 0.15 |
| 0.04 | 0.08 | 0.41 | 1.11 | 2.54 | 5.69 | 3.36 | 9.35 | 0.10 |
| 0.00 | 0.01 | 0.12 | 0.47 | 1.93 | 6.12 | 1.08 | 4.26 | 0.10 |
| 0.38 | 0.29 | 0.59 | 3.10 | -0.51 | -2.21 | 0.36 | 1.93 | 0.18 |
| 0.49 | 0.49 | 0.65 | 2.54 | -0.48 | -1.52 | 1.45 | 5.77 | 0.14 |
| 0.17 | 0.18 | 0.35 | 2.23 | 0.81 | 4.24 | 1.56 | 10.15 | 0.12 |
| 0.56 | 0.54 | 0.85 | 2.33 | 1.12 | 2.53 | 1.50 | 4.22 | 0.09 |
| 1.11 | 1.21 | 1.17 | 1.69 | 2.46 | 2.91 | -0.76 | -1.12 | 0.10 |
| 0.14 | 0.11 | 0.69 | 1.60 | 3.48 | 6.66 | 4.42 | 10.50 | 0.14 |
| 0.47 | 0.43 | 0.80 | 3.50 | 0.48 | 1.73 | 1.86 | 8.32 | 0.19 |
| 0.31 | 0.31 | 0.45 | 2.57 | 0.44 | 2.07 | 0.86 | 4.99 | 0.11 |
| 0.39 | 0.06 | 1.25 | 3.34 | 2.36 | 5.22 | 4.94 | 13.52 | 0.22 |
| 0.48 | 0.45 | 0.90 | 1.39 | 2.36 | 3.11 | 3.17 | 5.61 | 0.08 |
| 0.44 | 0.38 | 0.46 | 0.61 | 4.48 | 5.05 | -1.08 | -1.64 | 0.20 |
| -0.42 | -0.02 | -0.27 | -0.27 | 0.51 | 0.42 | 3.20 | 3.58 | 0.03 |
| -0.05 | 0.10 | -0.47 | -0.47 | 7.39 | 6.14 | -4.81 | -4.95 | 0.21 |
| -0.12 | 0.01 | -0.94 | -1.16 | -1.77 | -1.80 | -7.65 | -9.66 | 0.10 |
| 0.67 | 0.38 | 1.10 | 1.51 | 2.88 | 3.26 | 0.89 | 1.25 | 0.07 |
| 0.62 | 0.58 | 1.20 | 2.50 | 0.22 | 0.38 | 4.09 | 8.71 | 0.14 |
| 0.92 | 0.93 | 0.90 | 4.53 | -0.31 | -1.29 | -0.95 | -4.86 | 0.36 |
| 2.31 | 2.10 | 2.20 | 2.40 | 4.76 | 4.40 | -1.29 | -1.55 | 0.23 |
| 0.66 | 0.74 | 0.67 | 1.77 | 0.85 | 1.85 | 0.03 | 0.09 | 0.07 |
| 0.45 | 0.33 | 0.90 | 2.11 | 2.77 | 5.39 | 2.34 | 5.67 | 0.12 |
| 0.19 | 0.24 | -0.42 | -0.24 | 0.52 | 0.26 | -7.34 | -4.68 | 0.05 |
| 2.32 | 2.05 | 3.05 | 3.31 | 9.43 | 8.43 | 5.32 | 5.90 | 0.26 |
| 0.03 | 0.20 | -0.27 | -0.47 | 4.31 | 6.10 | -4.00 | -7.05 | 0.26 |
| 0.06 | 0.03 | 0.23 | 2.10 | 1.22 | 9.12 | 1.25 | 11.57 | 0.21 |
| 0.06 | 0.05 | 0.15 | 0.26 | 1.56 | 2.14 | 0.38 | 0.65 | 0.02 |
| -2.50 | -0.04 | -2.13 | -0.86 | 6.22 | 2.06 | 11.94 | 4.90 | 0.06 |
| 0.38 | 0.30 | 1.01 | 2.70 | 2.22 | 4.88 | 4.43 | 12.10 | 0.17 |
| 0.25 | 0.14 | 0.66 | 2.80 | -0.07 | -0.23 | 2.49 | 10.86 | 0.20 |
| 1.05 | 0.54 | 2.56 | 3.16 | 7.75 | 7.87 | 9.82 | 12.35 | 0.23 |
| -1.08 | -0.24 | -1.09 | -0.84 | 0.96 | 0.61 | 1.55 | 1.21 | 0.02 |

ONSITE ENERGY CORP -CL A

# Chapter 14

# Arbitrage Pricing Model

The arbitrage pricing model (based on the arbitrage pricing theory) was first introduced academically in 1976. In 1988 it first became available in a commercially usable form. It relies on risk factors of a pervasive economic nature.

## MULTIPLE CHOICE QUESTIONS

1. All of the following are risk factors commonly considered by the arbitrage pricing model EXCEPT:

   a. Company-specific risk.

   b. Confidence risk, measured as the difference between long-term corporate bond expected returns and long-term government bond expected returns.

   c. Interest rate (time horizon) risk.

   d. Inflation risk.

2. Which of the following best describes the arbitrage pricing model?

   a. A linear model.

   b. A multivariable model.

   c. A discounted cash flow (DCF) model.

   d. A build-up model.

## TRUE OR FALSE QUESTIONS

3. The arbitrage pricing model does not specify its risk factors. True False

4. The arbitrage pricing model works better for individual stocks than for groups of stocks. True False

5. The arbitrage pricing model is used less than the build-up model, the Capital Asset Pricing Model, or the DCF model. True False

6. The arbitrage pricing model would work well for estimating the cost of equity capital for a regional chain of doughnut shops. True False

# PART III
# Other Topics Related to Cost of Capital

# Chapter 15

# Minority versus Control Implications of Cost of Capital Data

The subject of this chapter is the relationship between the merger market and the public stock market, and the implications of that relationship—that is, the extent to which an income approach to valuation, based on cost of capital, produces a minority value or a control value.

## MULTIPLE CHOICE QUESTIONS

1. In which of the following methods of estimating the cost of equity capital are data gathered from transactions in public stock?

   a. The build-up method and the Capital Asset Pricing Model (CAPM) but not the discounted cash flow (DCF) method.

   b. The build-up method and the DCF method but not CAPM.

   c. CAPM and the DCF method but not the build-up method.

   d. The build-up method, CAPM, and the DCF method all gather data from transactions in public stocks.

2. Whether the income approach produces a control or a minority value:

   a. Depends primarily on the nature of the cash flows being discounted or capitalized.

   b. Depends primarily on the discount or capitalization rate.

   c. Depends about equally on the nature of the cash flows and the discount or capitalization rate.

   d. Is disputed, that is, there is no consensus as to the extent to which it depends primarily on the nature of the cash flows or the discount or capitalization rate.

3. Over the period 1998 to 2001, about what percentage of takeovers of public companies were at less than the public trading price immediately prior to the takeover?

   a. Less than 5%.

   b. Between 5% and 10%.

c. Between 10% and 15%.

d. Over 15%.

4. The cost of capital as viewed by the investor rather than the investment is a function of what standard of value?

   a. Fair market value.

   b. Investment value.

   c. Fair value.

   d. Intrinsic value.

5. Which of the following is the most accurate statement about the relative characteristics of the public stock market and the merger market?

   a. The stock market is more liquid, has a higher tolerance for risk, and generally has a longer investment horizon.

   b. The stock market is more liquid, has a lower tolerance for risk, and generally has a shorter investment horizon.

   c. The stock market is more liquid, has a higher tolerance for risk, and generally has a shorter investment horizon.

   d. The stock market is less liquid, has a higher tolerance for risk, and generally has a shorter investment horizon.

6. A stock selling at $10.00 per share had net cash flow last year of $1.00 per share and net income of $1.50 per share. The estimated cost of equity capital is 15%. Given this information, which of the following represents a conclusion that can be reached about this stock?

   a. The stock is selling at minority value because it is capitalized at an unreasonably low value relative to its earnings.

   b. The stock is selling at control value because it is fully valued relative to its last year's net cash flow.

   c. We cannot tell whether it is at minority or control value because we don't know whether last year's net cash flow represents normalized net cash flow, nor do we know the expected growth rate.

   d. The stock is selling at minority value because the discount rate probably is less than the capitalization rate.

## TRUE OR FALSE QUESTIONS

7. If company cash flows are maximized and the returns distributed pro rata to all shareholders, then there may be no difference between a control value and a minority value. True False

8. The cost of capital is based on public stock market transactions, which are, by definition, minority interests. Therefore, the income approach to valuation, by definition, produces a minority interest value. True False

9. Minority stockholders can register their shares for a secondary offering but not for an initial public offering. True False

## FILL-IN-THE-BLANK QUESTIONS

10. On the latest version of the traditional "levels of value" chart, the line that has been added above "control value" is called

    _____

11. What is the name of the primary source of takeover premiums for public companies?

    _____

## EXERCISE

12. Given the following:

| | |
|---|---|
| Control value | $20 per share |
| Minority discount | 20% |
| Discount for lack of marketability | 40% |

What is the value of nonmarketable minority shares?

# Chapter 16

# Handling the Discount for Lack of Marketability

Most valuations using the income approach rely on data from the public securities markets, which are highly liquid. Consequently, especially when valuing minority interests in a closely held company, a discount for lack of marketability is applicable to the value derived from the income approach. Alternatively, a percentage may be added to the discount or capitalization rate to reflect the relative lack of marketability.

## MULTIPLE CHOICE QUESTIONS

1. Which of the following is a correct statement about discount for lack of marketability studies?

   a. Restricted stock studies apply to minority interests, while pre-initial public offering (IPO) studies apply to controlling interests.

   b. Restricted stock studies apply to controlling interests, while pre-initial public offering (IPO) studies apply to minority interests.

   c. Both restricted stock studies and pre-IPO studies apply to minority interests.

   d. Both restricted stock studies and pre-IPO studies apply to controlling interests.

2. What is the most comprehensive restricted stock study to date?

   a. Standard Research Consultants study.

   b. William Silber study.

   c. *The FMV Restricted Stock Study*™.

   d. Management Planning study.

3. Which of the following pre-IPO studies contains the most transactions for a given year?

   a. John Emory studies (formerly Baird & Co.).

   b. Willamette Management Associates studies.

c. *Valuation Advisors' Lack of Marketability Discount Study*™.

d. The Willamette Management and Valuation Advisors studies have about the same number of transactions per year, each more than the Emory studies.

4. Which of the following is the correct statement about studies on discounts for lack of marketability?

   a. Both restricted stock studies and pre-IPO studies have shown relatively constant discounts from the 1970s to the present.

   b. Restricted stock studies have shown decreasing discounts since 1990, when the SEC started loosening reporting and trading restrictions, while the pre-IPO studies have shown relatively constant discounts over time.

   c. Both restricted stock and pre-IPO studies have shown decreasing discounts since 1990, when the SEC started loosening reporting and trading restrictions.

   d. Average discounts from both restricted stock and pre-IPO studies have been highly volatile from the 1970s to the present.

5. Which of the following is a correct statement about discounts for lack of marketability in the U.S. Tax Court?

   a. Discounts for lack of marketability usually are not allowed for either controlling interests or minority interests.

   b. Discounts for lack of marketability are not allowed for controlling interests, but they usually are allowed for minority interests.

   c. Discounts for lack of marketability sometimes are allowed for controlling interests, but they tend to be smaller than for minority interests.

   d. Discounts for lack of marketability usually are allowed for both controlling interests and minority interests, and tend to be about the same for both.

## TRUE OR FALSE QUESTIONS

6. The cost of capital for an investment increases with increasing liquidity and decreases with decreasing liquidity. True False

7. The discount for lack of marketability may be reflected in a discrete discount at the end of a valuation performed by the discounted cash flow or capitalization methods, or it may be reflected as an added factor in the discount or capitalization rate. True False

8. A "restricted stock" is one that is in all respects equivalent to a publicly traded stock except for restrictions on trading. True False

9. The "pre-IPO studies" refer to studies of transactions in securities of privately held companies prior to an initial public offering. True False

10. The fact that discounts for lack of marketability in the restricted stock studies have decreased in recent years is an indication that discounts for lack of marketability for closely held minority stocks should be less than in the past. True False

# Chapter 17

# How Cost of Capital Relates to the Excess Earnings Method of Valuation

Unlike the methods previously presented for deriving capitalization rates for a class of investment (liability or equity), the excess earnings method derives capitalization rates applicable to the asset side of the balance sheet.

## MULTIPLE CHOICE QUESTIONS

1. What was the origin of the excess earnings method (i.e., to what use was it put initially)?

   a. Payments by the U.S. government to compensate brewers and distillers for their economic loss of goodwill as a result of Prohibition.

   b. Payments by the U.S. government to subsidize small businesses during the Depression.

   c. Calculations of taxes on capital gains when the capital gains tax first went into effect.

   d. Calculation of taxes on capital gains starting in 1968.

2. What is the number of the Revenue Ruling that addresses the excess earnings method?

   a. 59-60.

   b. 68-609.

   c. 77-287.

   d. 83-120.

## TRUE OR FALSE QUESTION

3. The weighted average of the two capitalization rates used in the excess earnings method should be approximately equal to the capitalization rate for the entire company derived through other methods such as the build-up method or CAPM. True False

## FILL-IN-THE-BLANK QUESTION

4. The excess earnings method requires two capitalization rates. What are these two rates applied to?

_____

_____

## EXERCISES

Given the following pro forma information about Dad's Repair Co.:

| | |
|---|---|
| Net tangible assets | $300,000 |
| Expected net cash flow for coming year | 60,000 |
| Required rate of return on tangible assets | 8% |
| Required rate of return on intangible assets (excess earnings) | 20% |

5. Value Dad's Repair Company by the excess earnings method.

6. Compute the implied blended capitalization rate on the tangible and intangible assets by the excess earnings method.

7. Given an estimated capitalization rate of 18% by the build-up method, is the company overvalued or undervalued by the excess earnings method? By how much?

8. What are the probable reasons for this undervaluation or overvaluation?

# Chapter 18

# Common Errors in Estimation and Use of Cost of Capital

This chapter reviews some of the concepts discussed throughout the book that are most commonly misunderstood or misapplied.

## MULTIPLE CHOICE QUESTIONS

1. Which of the following is a correct statement?

   a. The discount rate is equal to the capitalization rate.

   b. The discount rate is the reciprocal of the capitalization rate.

   c. The discount rate is equal to the capitalization rate minus the rate of growth in perpetuity.

   d. The discount rate is equal to the capitalization rate plus the rate of growth in perpetuity.

2. The proper discount rate to use when evaluating a potential acquisition by the discounted cash flow (DCF) method is:

   a. The acquiring company's overall cost of capital.

   b. The acquiring company's cost of equity.

   c. The acquiring company's "hurdle rate."

   d. A rate that reflects the risk of the potential acquisition.

3. Which of the following is the most correct statement?

   a. Historical returns should be capitalized because they are factual and not speculative.

   b. Historical returns should be extrapolated into the future to be discounted or capitalized.

   c. Historical returns should be used only for guidance about what is reasonable to expect in the future.

   d. Historical returns should be ignored when forecasting the future.

4. Which of the following is/are the most correct statement(s) about Risk Management Association's (formerly Robert Morris Associates) *Annual Statement Studies*?

   a. The industry returns that they compile are a good indication of the cost of capital for that industry.

   b. The industry returns that they compile should not be used as a source for cost of capital because they are historical and may not represent expectations about the future.

   c. The industry returns that they compile should not be used as a source for cost of capital because they are based on book values rather than on market values.

   d. Both (b) and (c) are correct.

5. Which of the following is a correct statement?

   a. In the United States, it is most common to state the discount rate in nominal terms, that is, not including inflation.

   b. In the United States, it is most common to state the discount rate in nominal terms, that is, including inflation.

   c. In the United States, it is most common to state the discount rate in real terms, that is, not including inflation.

   d. In the United States, it is most common to state the discount rate in real terms, that is, including inflation.

6. If an acquiring company were to use its own cost of capital for valuation by the DCF method rather than the target cost of capital for the potential acquiree, the result would most likely be what standard of value?

   a. Fair market value.

   b. Fair value.

   c. Investment value.

   d. Intrinsic value.

7. If an acquiring company were to include the benefit of its synergies with the target company in the cash flow projections for valuation of the target, the result would most likely be what standard of value?

   a. Fair market value.

   b. Fair value.

   c. Investment value.

   d. Intrinsic value.

8. Using Ibbotson's data, the equity risk premium should be selected to match which of the following maturities of U.S. government obligations?

   a. 30 days, 5 years, or 30 years.

   b. 1 year, 5 years, or 30 years.

   c. 30 days, 10 years, or 20 years.

   d. 30 days, 5 years, or 20 years.

9. Which of the following is a correct statement about the size premium?

   a. The Ibbotson data specify the boundaries of the company size, as measured by the market value of common equity, and the boundaries vary from year to year.

   b. The Ibbotson data specify the boundaries of company size, as measured by company revenues, and the boundaries vary from year to year.

   c. The Ibbotson data specify the boundaries of the company size, as measured by the market value of common equity, and the boundaries are constant from year to year.

   d. The Ibbotson data specify the boundaries of company size, as measured by company revenues, and the boundaries are constant from year to year.

## TRUE OR FALSE QUESTIONS

10. Decrease in the market value of an acquiring company's stock following an acquisition is a common phenomenon. True False

11. If a company foresees supergrowth in the short term, then a discounting model would be more appropriate than a capitalization model. True False

12. The excess earnings method has capitalization rates for two categories of capital, while the weighted average cost of capital (WACC) is not limited in its categories of capital. True False

13. In estimating the terminal value for a company that is expected to grow beyond the terminal year, capital expenditures should be estimated to be equal to depreciation in the terminal year. True False

14. For the purpose of valuation, a company's capital structure should be the weighted average of the book values of the respective capital structure components. True False

15. Within CAPM, a portion of the company-specific risk premium is captured in the size premium. True False

# Chapter 19

# Cost of Capital in the Courts

Cost of capital plays a critical role in a variety of court cases in most venues, including both federal and state courts. This chapter explores the treatment of cost of capital in various court settings.

## MULTIPLE CHOICE QUESTIONS

1. Which of the following state's courts have been the national trendsetter in shareholder disputes?

   a. New York

   b. New Jersey

   c. Delaware

   d. Pennsylvania

2. Which of the following is a correct statement about the valuation methods/approaches most favored by the Delaware Court of Chancery?

   a. The discounted cash flow (DCF) method is most favored, but the market approach and asset approach also are sometimes accepted.

   b. The market approach is most favored, but the DCF method and the asset approach also are sometimes accepted.

   c. The DCF method and the market approach have roughly equal acceptance, but the asset approach is sometimes accepted.

   d. The DCF method, the market approach, and the asset approach all are equally accepted.

3. Which of the following is the best statement about the approaches favored by the U.S. Tax Court?

   a. The market approach tends to be most favored, but the income approach has been gaining favor in recent years.

   b. The market approach tends to be most favored, and its margin of favor over the income approach has tended to increase in recent years.

c. The income approach tends to be most favored, but the market approach has been gaining favor in recent years.

d. The income approach tends to be most favored, and its margin of favor over the market approach has tended to increase in recent years.

## TRUE OR FALSE QUESTIONS

4. The U.S. Tax Court has consistently rejected the addition of a small stock premium in the estimation of a discount rate. True False

5. The U.S. Tax Court has yet to address the choice of beta in developing the cost of equity capital estimate. True False

6. Interest rates awarded on receivables in the bankruptcy courts have tended to be at the creditor's cost of capital. True False

7. Bankruptcy courts have not accepted the DCF method for valuation of a company on the basis that projected cash flows for a company in bankruptcy are too speculative to be reliable. True False

8. In utility rate-settings, it is recognized virtually universally that one of the costs the service provider is entitled to recover is the cost of its capital. True False

9. In rate-setting where it has jurisdiction, the Federal Communications Commission typically relies on classic DCF methodology. True False

10. Taxicab lease rates have been set based on the cost of company's weighted average cost of capital. True False

11. Cost of capital is getting increasing attention in family law courts. True False

12. Cost of capital is not a relevant concept in damages cases. True False

# Chapter 20

# Cost of Capital in Ad Valorem Taxation

Ad valorem taxes are taxes on the possession of property (as opposed to taxes on income or taxes on transfers of property). The term "ad valorem" means "according to value." For ad valorem tax purposes, most income-producing properties are assessed value by some variation of the income approach, and thus cost of capital plays an important role.

## MULTIPLE CHOICE QUESTIONS

1. Although state statutes use a variety of terms relating to ad valorem taxes, they all boil down to what standard of value?

   a. Market value.

   b. Investment value.

   c. Fair value.

   d. Intrinsic value.

2. In general, the preferred measure of return for ad valorem taxation is:

   a. EBIT.

   b. EBITDA.

   c. Net income.

   d. Net cash flow.

## TRUE OR FALSE QUESTIONS

3. Many ad valorem jurisdictions impose variations on the definition of income to which the cost of capital is to be applied to estimate value, in which case the analyst needs to make adjustments to the cost of capital to be consistent with the statutory or regulatory definition of income. True False

4. Some assessors like to account for the effect of ad valorem taxes by adding back the percentage relationship of tax to market value to the discount rate. True False

5. The size premium is often a factor in cost of equity for ad valorem taxes. True False

6. Traditionally, property tax assessors have used the capital structure at book value rather than market value as the appropriate measure of the employment of capital. True False

## EXERCISE

7. If the after-tax cost of capital is 10% and the tax rate is 40%, compute the cost of capital on pretax returns.

# Chapter 21

# Capital Budgeting and Feasibility Studies

Cost of capital is critical to capital budgeting, project selection, and feasibility studies. The application of cost of capital to capital budgeting is similar to the application of cost of capital to valuing a company.

## MULTIPLE CHOICE QUESTIONS

1. For capital budgeting, project selection, and feasibility studies, the preferred measure of economic income is:

   a. Net cash flow.

   b. EBITDA.

   c. EBIT.

   d. Net income.

2. For capital budgeting and project selection, the preferred measure of cost of capital is:

   a. The company's overall cost of capital.

   b. The company's marginal cost of capital.

   c. The project's cost of capital.

   d. The company's cost of equity capital.

3. According to Tom Copeland, the evidence that the market focuses on cash flows includes which of the following?

   a. Accounting earnings are not very well correlated with share prices.

   b. Earnings "window dressing" does not improve share prices.

   c. The market evaluates management decisions based on their expected long-term cash flow impact, not their short-term earnings impact.

   d. All of the above.

## TRUE OR FALSE QUESTIONS

4. When a company invests in a project that is expected to return less than the company's cost of capital, the expected result would be a decrease in shareholder value. True False

5. The characteristics of a project, either risk or special financing opportunities unique to the project, may cause the weighted average cost of capital (WACC) for the project to differ from the company's overall WACC. True False

# Chapter 22

# Central Role of Cost of Capital in Economic Value Added

Many companies have implemented Economic Value Added (EVA) as a management tool. This chapter gives particulars on how some companies implement EVA and how cost of capital plays a central role.

## MULTIPLE CHOICE QUESTIONS

1. In EVA, the assessment of business risk is based on:

   a. The build-up model.

   b. The Capital Asset Pricing Model.

   c. The DCF model.

   d. The Fama-French three-factor model.

2. The recommended criteria for leveraged stock options under EVA are:

   a. They are initially "at the money" and are bought, not granted.

   b. They are initially "in the money" and are bought, not granted.

   c. They are initially "at the money" and are granted, not bought.

   d. They are initially "in the money" and are granted, not bought.

## TRUE OR FALSE QUESTIONS

3. To compute EVA, the operating profit for the company and each of its units is charged for capital at a rate that blends the after-tax cost of debt and equity in the *target* proportions that each would plan to employ rather than the actual mix that each uses year by year. True False

4. The EVA bonus plan ties bonuses to absolute levels of EVA. True False

## FILL-IN-THE-BLANK QUESTIONS

5. What are the three principal ways of increasing value with EVA?

_____

_____

_____

6. The EVA ownership plan employs what two distinct elements?

_____

_____

## EXERCISE

7. A company with a 12% cost of capital that earns a 20% return on $100 million of net operating assets has an EVA of how much?

# Appendix

# Data Resources

This appendix describes the most important data sources used in estimating cost of capital. It is organized by type of information.

## MULTIPLE CHOICE QUESTIONS

1. Which of the following is NOT an Ibbotson Associates publication?

   a. *Mergerstat Review.*

   b. *Cost of Capital Yearbook.*

   c. *Stocks, Bonds, Bills, and Inflation.*

   d. *Beta Book.*

2. Which of the following is a source of public company acquisition valuation multiples?

   a. COMPUSTAT.

   b. *Mergerstat/Shannon Pratt's Control Premium Study*™.

   c. *BIZCOMPS*®.

   d. Zack's Investment Research, Inc.

3. Which of the following is a source of private company acquisition valuation multiples?

   a. COMPUSTAT.

   b. *Pratt's Stats*™.

   c. *BIZCOMPS*®.

   d. Both (b) and (c).

## FILL-IN-THE-BLANK QUESTIONS

4. Where is the *Standard & Poor's Corporate Value Consulting (S&P CVC) Risk Premium Report* available?

_____

5. What does the acronym EDGAR stand for?

_____

6. What is the primary source of equity risk premium data?

_____

7. What is the primary source of industry-average capital structures at market value?

_____

8. List three or more sources of individual company betas:

_____

_____

_____

9. List three or more sources of company earnings estimates:

_____

_____

_____

10. What is the primary source of publicly registered partnership transaction information?

_____

# SECTION TWO
# Answers

## PART I
## Cost of Capital Basics

# Chapter 1

# Defining Cost of Capital

## ANSWERS

### Multiple Choice Questions

1. b
2. d
3. d
4. b
5. c
6. a
7. c

### True or False Questions

8. True
9. False. Cost of capital is forward looking, based on expectations. Historical returns are used merely as a guide to what to expect in the future—for example, Ibbotson considers the long-term historical relationship of equity returns over U.S. Treasury-obligation returns the best guide to today's equity risk premium.
10. True

# Chapter 2

# Introduction to Cost of Capital Applications: Valuation and Project Selection

## ANSWERS

### Multiple Choice Questions

1. a. Some use net income, but Ibbotson rate of return data are specifically matched to net cash flow.
2. c
3. b. If return to equity is being discounted, the rate would be the equity discount rate. If return to the overall capital structure is being discounted, the rate would be the weighted average cost of capital.

### True or False Questions

4. True
5. True

### Fill-in-the-Blank Questions

6. Free cash flow
7. Capitalization rate

### Exercises

8.

| | Interest at end of year 1 | | Interest at end of year 2 | | Interest at end of year 3 | | Interest at end of year 4 |
|---|---|---|---|---|---|---|---|
| $PV =$ | $\frac{\$70}{(1+0.10)}$ | + | $\frac{\$70}{(1+0.10)^2}$ | + | $\frac{\$70}{(1+0.10)^3}$ | + | $\frac{\$1070}{(1+0.10)^4}$ |
| $=$ | $\frac{\$70}{(1.10)}$ | + | $\frac{\$70}{(1.21)}$ | + | $\frac{\$70}{(1.33)}$ | + | $\frac{\$1070}{(1.46)}$ |
| $=$ | \$63.64 | + | \$57.85 | + | \$52.63 | + | \$732.88 |
| $=$ | \$907.00 | | | | | | |

Alternatively, this may be computed by factors times dollars to be received:

Factor for year 1: $1/1.10 = 1/.909 = 0.909$
Factor for year 2: $1/(1.10)^2 = 1/1.21 = 0.826$
Factor for year 3: $1/(1.10)^3 = 1/1.33 = 0.752$
Factor for year 4: $1/(1.10)^4 = 1/1.46 = 0.685$

| | | |
|---|---|---|
| Year 1: $0.909 \times \$70$ | = | \$63.63 |
| Year 2: $0.826 \times \$70$ | = | 57.82 |
| Year 3: $0.752 \times \$70$ | = | 52.64 |
| Year 4: $0.685 \times \$1070$ | = | \$732.95 |
| | | \$907.04 |

(Differences are due to rounding.)

9. The company's embedded cost of capital for this bond is 7%. That is what they actually will pay over the life of the bond.

10. The company's market cost of capital for this bond is 10%. That is what they would have to pay if they were to issue comparable bonds at the valuation date.

# Chapter 3

# Net Cash Flow: The Preferred Measure of Return

## ANSWERS

### Multiple Choice Questions

1. d
2. c. The most likely outcome is the "modal" outcome, the one that has the greatest probability of occurrence. The probability-weighted expected value is the sum of the possible outcomes times the probability of occurrence of each.

### True or False Questions

3. True
4. True
5. True. The Ibbotson data used in CAPM and the build-up model matches to net cash flow.

### Exercises

6. Solution: Net cash flow to equity:

| | | |
|---|---|---|
| | Net income | $930,000 |
| + | Noncash charges | 100,000 |
| – | Capital expenditures | 120,000 |
| – | Additions to net working capital* | 20,000 |
| | Net cash flow to equity | $890,000 |

| | |
|---|---|
| *Working capital requirement 0.08 × $9,000,000 = | $ 720,000 |
| Current assets: | $1,000,000 |
| Minus current liabilities | $300,000 |
| | $700,000 |

Required addition to working capital: $720,000 – $700,000 = $20,000

7. Solution: Net cash flow to invested capital:

| | | |
|---|---|---|
| | Net income | $930,000 |
| + | Noncash charges | 100,000 |
| – | Capital expenditures | 120,000 |
| – | Additions to net working capital | 20,000 |
| + | Interest expense ($50,000 × [1–0.40]) | 30,000 |
| | Net cash flow to invested capital | $920,000 |

8. Solution:

| | | | |
|---|---|---|---|
| –$100 | × 0.10 | = | –$10 |
| 0 | × 0.20 | = | 0 |
| +$100 | × 0.40 | = | +$40 |
| +$150 | × 0.20 | = | +$30 |
| +$200 | × 0.10 | = | +$20 |
| | | | $80 |

9. $100

# Chapter 4

# Discounting versus Capitalizing

## ANSWERS

### Multiple Choice Questions

1. b
2. c
3. a
4. b
5. a. The midyear convention always produces a higher value because it assumes that the cash flows are received earlier and therefore need to be discounted for a shorter time period.

### True or False Questions

6. False. This is a common error. The terminal value is discounted for *n* periods. The terminal value is the value at the *end* of the *n*th period, the *beginning* of the $n + 1$ period.
7. False. The shorter the discrete projection period, the greater the impact of the terminal value on the present value.
8. True

### Fill-in-the-Blank Questions

9. Gordon Growth Model
10. Terminal value (also residual value)

### Exercises

11. $$\frac{\$10}{0.08} = \underline{\underline{\$125}}$$

12. $$\begin{aligned} c &= k - g \\ c &= 0.10 - 0.04 \\ &= 0.06 \end{aligned}$$

13. $$\begin{aligned} PV &= \frac{\$1.00(1+0.05)}{0.12-0.05} \\ &= \frac{\$1.05}{0.07} \\ &= \underline{\underline{\$15}} \end{aligned}$$

14. $$PV = \frac{\$1000}{1.20} + \frac{\$1200}{(1.20)^2} + \frac{\$1400}{(1.20)^3} + \frac{\$1550}{(1.20)^4} + \frac{\$1700}{(1.20)^5} + \frac{(1700 \times 1.06)/(0.20 - 0.06)}{(1.20)^5}$$
$$= \frac{\$1000}{1.20} + \frac{\$1200}{1.44} + \frac{\$1400}{1.73} + \frac{\$1550}{2.07} + \frac{\$1700}{2.49} + \frac{\$1802/0.14}{2.49}$$
$$= \$833.33 + \$833.33 + \$809.25 + \$748.79 + \$682.73 + \$5,169.25$$
$$= \$9,076.68$$

This also could be set up as factors:

| | | | |
|---|---|---|---|
| Year 1: | $1/1.20 = 0.8333 \times \$1,000$ | = | $833.00 |
| Year 2: | $1/1.44 = 0.6944 \times \$1,200$ | = | $833.28 |
| Year 3: | $1/1.73 = 0.5780 \times \$1,400$ | = | $809.20 |
| Year 4: | $1/2.07 = 0.4831 \times \$1,550$ | = | $748.81 |
| Year 5: | $1/2.49 = 0.4016 \times \$1,700$ | = | $682.72 |
| Terminal value | $1/2.49 = 0.4016 \times \$12,871$ | = | $5,168.99 |
| Total present value | | | $9,076.00 |

(Differences are due to rounding.)

15. $$PV = \frac{\$1.00(1 + 0.05)(1 + 0.12)^5}{0.12 - 0.05}$$
$$= \frac{\$1.05(1.06)}{0.07}$$
$$= \frac{1.11}{0.07}$$
$$= \$15.86$$

16. $$PV = \frac{\$1000}{(1.20)^{0.5}} + \frac{\$1200}{(1.20)^{1.5}} + \frac{\$1400}{(1.20)^{2.5}} + \frac{\$1550}{(1.20)^{3.5}} + \frac{\$1700}{(1.20)^{4.5}} + \frac{\$1700(1.06)(1.20)^{0.5}/(0.20 - 0.06)}{(1.20)^5}$$
$$= \frac{\$1000}{1.10} + \frac{\$1200}{1.31} + \frac{\$1400}{1.58} + \frac{\$1550}{1.89} + \frac{\$1700}{2.27} + \frac{\$1700(1.16)/0.14}{2.49}$$
$$= \$909.09 + \$916.03 + \$886.08 + \$820.11 + \$748.90 + \$5,656.91$$
$$= \$9,937.12$$

This also could be set up as factors:

| | | | |
|---|---|---|---|
| Year 1: | $1/1.10 = 0.9091 \times \$1,000$ | = | $909.10 |
| Year 2: | $1/1.31 = 0.7634 \times \$1,200$ | = | $916.08 |
| Year 3: | $1/1.58 = 0.6329 \times \$1,400$ | = | $886.06 |
| Year 4: | $1/1.89 = 0.5291 \times \$1,550$ | = | $820.11 |
| Year 5: | $1/2.27 = 0.4405 \times \$1,700$ | = | $748.85 |
| Terminal value | $1/2.49 = 0.4016 \times \$14,086$ | = | $5,656.94 |
| Total present value | | | $9,937.14 |

(Differences are due to rounding.)

Alternatively, instead of using the modified capitalization in the numerator of the terminal value factor, one can just use the regular Gordon Growth Model for the terminal value and discount the terminal value back to present value by an exponent of $n - 0.5$ (the same factor used to discount the $n$th installment in the discrete forecast).

This could be calculated as follows:

$$PV = \frac{\$1000}{(1.20)^{0.5}} + \frac{\$1200}{(1.20)^{1.5}} + \frac{\$1400}{(1.20)^{2.5}} + \frac{\$1550}{(1.20)^{3.5}} + \frac{\$1700}{(1.20)^{4.5}} + \frac{\$1700(1.06)/(0.20-0.06)}{(1.20)^{4.5}}$$

$$= \frac{\$1000}{1.10} + \frac{\$1200}{1.31} + \frac{\$1400}{1.58} + \frac{\$1550}{1.89} + \frac{\$1700}{2.27} + \frac{\$1802/0.14}{2.27}$$

$$= \$909.09 + \$916.03 + \$886.08 + \$820.11 + \$748.90 + \$5,670.23$$

$$= \$9,950.44$$

Set up in terms of factors, it would look as follows:

| | | | |
|---|---|---|---|
| Year 1: | $1/1.10 = 0.9091 \times \$1{,}000$ | = | \$909.10 |
| Year 2: | $1/1.31 = 0.7634 \times \$1{,}200$ | = | \$916.08 |
| Year 3: | $1/1.58 = 0.6329 \times \$1{,}400$ | = | \$886.06 |
| Year 4: | $1/1.89 = 0.5291 \times \$1{,}550$ | = | \$820.11 |
| Year 5: | $1/2.27 = 0.4405 \times \$1{,}700$ | = | \$748.85 |
| Terminal value | $1/2.27 = 0.4405 \times \$12{,}871$ | = | \$5,669.68 |
| Total present value | | | \$9,949.88 |

(Differences are due to rounding.)

# Chapter 5

# Relationship between Risk and the Cost of Capital

## ANSWERS

### Multiple Choice Questions

1. d. The risk of potential changes in interest rates, or the maturity premium, is subsumed under the "risk-free" rate.
2. c
3. b
4. b

### True or False Questions

5. True
6. True
7. True

### Fill-in-the-Blank Questions

8. a. Maturity risk (horizon risk, interest rate risk)
   b. Systematic risk (market risk)
   c. Unsystematic risk (company risk, specific risk, residual risk)
9. Beta
10. Weighted average cost of capital (WACC)

# Chapter 6

# Cost Components of a Company's Capital Structure

## ANSWERS

### Multiple Choice Questions

1. b
2. b
3. b

### True or False Questions

4. True. However, some bank provisions require the debt to be at zero for some period, such as 30 days. In such case, one normally would not reclassify the debt as long term.
5. True

### Fill-in-the-Blank Questions

6. a. Debt
   b. Preferred stock
   c. Common stock
7. a. Convertible preferred stock
   b. Convertible debt
   c. Warrants
   d. Options
   e. Leases
8. a. Straight bond or preferred
   b. A warrant or option
9. a. Dividends or distributions (withdrawals)
   b. Appreciation or depreciation in market value
10. $k_d = k_{d(pt)} (1 - t)$

    Where:

    $k_d$ = Discount rate for debt (net of tax effect)
    $k_{d(pt)}$ = Rate of interest for debt (the company's pretax cost of debt capital)
    $t$ = tax rate

    $0.08 (1 - 0.20) = 0.08 (0.8) = 0.064 = 6.4\%$

# Chapter 7

# Weighted Average Cost of Capital

## ANSWERS

### Multiple Choice Questions

1. b. Because WACC is a blended cost of capital, it is used to discount or capitalize returns to all invested capital.
2. d. To get the after-tax cost of debt, the pretax cost of debt must be tax-affected. Answers (a), (b), and (c) are all pretax.

### True or False Questions

3. False. In this case, the company's actual amount of debt and equity in its capital structure may be appropriate. This is because a minority stockholder would not be able to change the capital structure of the company.
4. True

### Fill-in-the-Blank Questions

5. Market; book
6. Net
7. Iterative (repetitious)
8. Underestimate; overvalue

### Exercises

9. b. Because the market price per share for the preferred stock is $16.00 and its dividend per share is $2.40 per share per year, the cost of preferred equity is $2.40/$16.00 = 0.15 or 15%.
10. d. In the return to the debt component, interest is a tax-deductible expense to a corporate taxpayer. One way to approximate the cost of debt after taxes or net of the tax effect is to multiply the cost of debt before tax by (1 – tax rate): $10\% \times (1 - 0.40) = 0.10 \times 0.60 = 6\%$.

11. The capital structure weights and the market value of invested capital for Company XYZ can be computed as follows:

| Component | Amount | Price | Component Total | Weight |
|---|---|---|---|---|
| Common stock | 4,000,000 | $10 | $40,000,000 | 50% |
| Preferred stock | 2,000,000 | $16 | $32,000,000 | 40% |
| Debt | $10,000,000 | 0.80 | $8,000,000 | 10% |
| Market value of invested capital: | | | $80,000,000 | 100% |

12. d. The formula for calculating WACC is:

$$\text{WACC} = (k_e \times W_e) + (k_p \times W_p) + [k_{d(pt)}\,(1 - t\,) \times W_d]$$
$$= (25\% \times 0.50) + (15\% \times 0.40) + [10\%\,(1 - 0.40) \times 0.10]$$
$$= 12.5\% + 6\% + 0.6\%$$
$$= 19.10\%$$

Or, setting this in tabular form:

| Component | Cost | Weight | Weighted cost |
|---|---|---|---|
| Common stock | 25% | 0.50 | 12.5% |
| Preferred stock | 15% | 0.40 | 6.0% |
| Debt (after tax) | 6% | 0.10 | 0.6% |
| Weighted average cost of capital | | | 19.1% |

13. Capital structure:

| Component | Amount | Price | Component total | |
|---|---|---|---|---|
| Common stock | 1,000,000 shares | $7.0 | $7,000,000 | 57.1% |
| Preferred stock | 500,000 shares | $4.5 | $2,250,000 | 18.4% |
| Debt | | | $3,000,000 | 24.5% |
| Total: | | | $12,250,000 | 100.0% |

| Component | Cost | | Weight | Weighted Cost | |
|---|---|---|---|---|---|
| Common stock | 0.20 | × | 0.571 = | 0.114 | |
| Preferred stock | 0.09 | × | 0.184 = | 0.017 | |
| Debt 0.10 × (1 – 0.30) = | 0.07 | × | 0.245 = | 0.017 | |
| | | | 1.00 | 0.148 = | 14.8% |

# PART II
# Estimating the Cost of Equity Capital

# Chapter 8

# Build-up Models

## ANSWERS

### Multiple Choice Questions

1. b
2. d
3. b
4. b

### True or False Questions

5. False. Ibbotson's risk premium series are based on 1-, 5-, and 20-year maturities, so using a 10-year maturity for the risk-free rate does not have a matching risk premium.
6. False
7. True
8. True

### Fill-in-the-Blank Questions

9. Equity risk premium
10. Historic
11. Lower; equal
12. Risk-free; risk
13. Risk premium
14. Does

### Exercises

15. The formula for the arithmetic mean equity risk premium is:

$$\bar{x} = \frac{\sum_{n}^{l} R_i}{n}$$

where:

$\bar{x}$ = arithmetic average
$R_i$ = the excess return for period $i$
$n$ = number of observation periods

We can tabulate the data as follows:

| Year | Returns on the Market | Returns on U.S. Treasury Obligations | Excess Returns on the Market |
|---|---|---|---|
| 1 | 0.43 | 0.03 | 0.40 |
| 2 | 0.15 | 0.06 | 0.09 |
| 3 | 0.20 | 0.02 | 0.18 |
| 4 | –0.30 | 0.05 | –0.35 |
| 5 | 0.02 | 0.06 | –0.04 |

Short-term arithmetic mean equity risk premium = 0.28/5 = 5.6% or ≅ 6%

16. The formula for the geometric mean is:

$$G = \left[\prod_{n}^{1}(1+R_i)\right]^{1/n} - 1$$

where:

$G$ = Geometric average
$R_i$ = Return for the $i$th period (the returns measured for each period are actually excess returns, that is, the difference between the equity market return and the Treasury-obligation income return for the period)
$n$ = Number of observation periods

We can tabulate the results as follows:

| Year | Returns on the Market | Returns on U.S. Treasury Obligations | 1 + Excess Return on the Market |
|---|---|---|---|
| 1 | 0.43 | 0.03 | 1.40 |
| 2 | 0.15 | 0.06 | 1.09 |
| 3 | 0.20 | 0.02 | 1.18 |
| 4 | –0.30 | 0.05 | 0.65 |
| 5 | 0.02 | 0.06 | 0.96 |

Short-term geometric mean equity risk premium = $\sqrt[5]{1.1236} - 1 = 1.02 - 1 = 0.02$ or 2%

17.

| | |
|---|---|
| Risk-free rate | 6% |
| + Equity risk premium | 7% |
| + Size premium | 8% |
| + Company risk premium | 2% |
| ABC cost of equity capital | 23% |

# Chapter 9

# Capital Asset Pricing Model

## ANSWERS

### Multiple Choice Questions

1. c
2. d
3. a
4. d
5. a
6. b. Unsystematic risk is a function of the industry, the individual company, and the type of investment interest.
7. c

### True or False Questions

8. True
9. False
10. False. The systematic risk is what *cannot* be diversified away.
11. False. The rates of return tend to move with a lower magnitude, but not in the opposite direction. Only securities with a negative beta tend to move in the opposite direction, and there are very few of those.

### Fill-in-the-Blank Questions

12. Systematic risk (beta)
13. Beta (systematic risk)
14. Beta (systematic risk)
15. In the same; greater

## Exercises

16. 12%

The equity risk premium for security XYZ, $RP_i$, is equal to beta times the equity risk premium for the market as a whole:

| | |
|---|---|
| $\text{Beta}_{XYZ}$ | 1.5 |
| $RP_m$ | $\times$ 8% |
| $RP_i$ | 12% |

17. 18%

The formula for computing the cost of equity based on CAPM is:

$$\begin{aligned} E(R_i) &= R_f + B \times (RP_m) \\ &= 0.06 + (1.5 \times 0.08) \\ &= 0.06 + 0.12 \\ &= 0.18 \text{ or } 18\% \end{aligned}$$

18. 1.5

Directly, from CAPM: $E(R_i) - R_f = B \times (RP_m)$

$$B = \frac{E(R_i) - R_f}{RP_m} = \frac{12\%}{8\%} = 1.5$$

# Chapter 10

# Proper Use of Betas

## ANSWERS

### Multiple Choice Questions

1. c
2. b

### True or False Questions

3. True
4. False. The difference between CAPM and the build-up model is that CAPM incorporates beta and the build-up model does not.
5. False
6. False. You would unlever it for the private company, based on that company's capital structure.

### Fill-in-the-Blank Questions

7. Industry's
8. Business; financial (capital structure)
9. Lower
10. Vasicek Shrinkage Technique
11. Excess; total; excess
12. 60; 36
13. Levered

### Exercises

14. $B_L = B_u \times (1 + (1 - t) \times W_d/W_e)$
    $= 1.25 \times (1 + (1 - 0.40) \times 0.75/0.25)$
    $= 1.25 \times (1 + 0.60 \times 3)$
    $= 1.25 \times (2.8)$
    $= 3.5$

15. $1 + (1 - t)W_d / W_e = \dfrac{B_L}{B_U}$

$$(1 - t)W_d / W_e = \frac{B_L}{B_U} - 1$$

$$0.60 \times W_d / W_e = \frac{1.40}{0.50} - 1$$

$$0.60 \times W_d / W_e = 2.8 - 1$$

$$W_d / W_e = \frac{1.8}{0.6}$$

$W_d / W_e = 3$ or $D / E = 3$ or $D = 3E$

We also know that total capital equals \$100 million so:

$D + E =$ \$100,000,000
$4E =$ \$100,000,000
$E =$ \$25,000,000
$D =$ 3E = \$75,000,000

The estimated equity value for Company XYZ is \$25 million.

# Chapter 11

# Size Effect

## ANSWERS

### Multiple Choice Questions

1. c
2. d. The size premium is calculated as the realized return in excess of the riskless rate minus the CAPM-estimated return in excess of the riskless rate.

### True or False Questions

3. False. The distinction is the beta for the security.
4. False. The S&P CVC studies use 25 size categories and start in 1963, when COMPUSTAT started, because they use COMPUSTAT data.

### Fill-in-the-Blank Questions

5. Higher; higher
6. Tenth (10th) or 10b, the bottom half of the 10th decile

### Exercises

7. The size premium as computed by Ibbotson equals the realized return in excess of the riskless rate minus the CAPM-estimated return in excess of the riskless rate.

   So, 16% – 11% = 5%

8. According to CAPM, the CAPM-estimated return in excess of the risk-free rate can be expressed as:

   $$E(R_i) - R_f = B \times (RP_m)$$
   $$11\% = 1.5 \times RP_m$$
   $$RP_m = 11\%/1.5 = 7.33\%$$

9. The equity risk premium for the 10th decile, according to CAPM, is equal to the return above the risk-free rate, or 10.67%, rounded to 11%.

10. According to CAPM:

$$E(R_i) = R_f + B \times (RP_m)$$
$$= 6\% + 1.5 \times 7.33\%$$
$$= 6\% + 11\%$$
$$= 17\%$$

11. To compute this, we will use the realized return in excess of the riskless rate, instead of the CAPM-estimated return in excess of the riskless rate.

From CAPM:

$$E(R_i) = R_f + B \times (RP_m)$$
$$E(R_i) - R_f = B \times RP_m$$
$$16\% = B \times 7.33\%$$
$$B = 2.18$$

# Chapter 12

# Discounted Cash Flow Method of Estimating Cost of Capital

## ANSWERS

### Multiple Choice Questions

1. b
2. c
3. d. CAPM assumes that rational investors seek to hold efficient portfolios but the DCF method of estimating cost of capital does not make this assumption.

### True or False Questions

4. False. Most published estimates come from "sell-side" analysts.
5. True. This is generally true because single-stage models rely on short- to intermediate-term earnings forecasts, which may not represent sustainable growth.

### Fill-in-the-Blank Questions

6. a. Single-stage model
   b. Multistage model
7. Ibbotson's *Cost of Capital Yearbook*

### Exercises

8. $$k = \frac{NCF_o(1+g)}{PV} + 0.05$$
$$= \frac{\$1.00(1+0.05)}{\$10.00} + 0.05$$
$$= \frac{\$1.05}{\$10.00} + 0.05$$
$$= 0.105 + 0.05$$
$$= 0.155 \text{ or } 15.5\%$$

9. Company XYZ's cost of equity capital equals 0.098083 or 9.81%.

$PV$ = \$61.70
$NCF_0$ = \$1.60
$NCF_5$ = \$2.24
$NCF_{10}$ = \$3.73
$g_1$ = 0.070
$g_2$ = 0.107
$g_3$ = 0.065

Note: $NCF_5 = NCF_0 \times (1 + g_1)^5$ and $NCF_{10} = NCF_0 \times (1 + g_1)^5 \times (1 + g_2)^5$

$$PV = \sum_{n=1}^{5} \frac{\left[NCF_0(1+g_1)^n\right]}{(1+k)^n} + \sum_{n=6}^{10} \frac{\left[NCF_5(1+g_2)^{n-5}\right]}{(1+k)^n} + \frac{\dfrac{NCF_{10}(1+g_3)}{k-g_3}}{(1+k)^{10}}$$

Using modern spreadsheet applications, one can estimate the cost of equity capital by iteratively solving the three-stage DCF model for $PV$. With the exception of $PV$, set one cell equal to each of the values (arguments) indicated above and one cell equal to a preliminary estimate of $k$. Finally, enter the three-stage DCF formula into one cell with each of the formula's arguments referring to the appropriate cell containing that argument. Then simply enter in different values for $k$ until the indicated $PV$ is equal to that of the current stock price.

The following formula was created using Microsoft Excel® and solves the three-stage DCF model for $PV$, where the value for the following arguments are entered in the indicated cells:

$NCF_0$ = B3
$NCF_5$ = E2
$NCF_{10}$ = E3
$g_1$ = B4
$g_2$ = B5
$g_3$ = B6
$k$ = E2

=(((B3*(POWER(1+B4,1)))/(POWER(1+E4,1)))+((B3*(POWER(1+B4,2)))/(POWER(1+E4,2)))+((B3*(POWER(1+B4,3)))/(POWER(1+E4,3)))+((B3*(POWER(1+B4,4)))/(POWER(1+E4,4)))+((B3*(POWER(1+B4,5)))/(POWER(1+E4,5))))+(((E2*(POWER(1+B5,1)))/(POWER(1+E4,6)))+((E2*(POWER(1+B5,2)))/(POWER(1+E4,7)))+((E2*(POWER(1+B5,3)))/(POWER(1+E4,8)))+((E2*(POWER(1+B5,4)))/(POWER(1+E4,9)))+((E2*(POWER(1+B5,5)))/(POWER(1+E4,10))))+(((E3*(1+B6))/(E4–B6))/(POWER(1+E4,10)))

To help you better understand the Microsoft Excel® statement, the following presents the same statement in its algebraic form:

$$PV = \sum_{n=1}^{5} \frac{\left[B3(1+B4)^n\right]}{(1+E4)^n} + \sum_{n=6}^{10} \frac{\left[E2(1+B5)^{n-5}\right]}{(1+E4)^n} + \frac{\dfrac{E3(1+B6)}{E4-B6}}{(1+E4)^{10}}$$

# Chapter 13

# Using Ibbotson Associates Cost of Capital Data

## ANSWERS

### Multiple Choice Questions

#### *SBBI Classic and Valuation Editions*

1. a
2. d
3. b
4. d
5. d
6. c
7. d
8. b
9. d. (a) and (c) are also true.
10. d
11. b
12. c

#### *Beta Book*

13. a
14. a
15. d
16. a
17. d. Private company stocks have no market prices; therefore, betas for private companies cannot be computed directly.
18. c

## True or False Questions

### *SBBI Classic and Valuation Editions*

19. False
20. False. What Ibbotson now calls the "size premium" is the size premium in excess of CAPM (or the beta-adjusted size premium). What Ibbotson calls the "small stock premium" is the historical arithmetic mean difference between returns on the S&P 500 and the stocks of a smaller size category.
21. False. The 10th decile is the lowest market capitalization.
22. True
23. True
24. True
25. True
26. True
27. False
28. False. When interest rates in general go up, market prices of outstanding fixed income securities go down, and vice versa, causing uncertainty (risk) about the net gain/loss from the sale.
29. True
30. False. Ibbotson uses all the data from 1926 forward.
31. False

### *Beta Book*

32. False. The *Beta Book* provides only betas.
33. False
34. True
35. True
36. False

## Fill-in-the-Blank Questions

### *SBBI Classic and Valuation Editions*

37. S&P 500 Index
38. 20-year U.S. Treasury bond
39. Arithmetic; geometric
40. Survey results
41. Supply-side
42. Lower
43. Company; industry
44. Risk-free rate; equity risk premium; firm size premium
45. Corporate; personal
46. Industries

## Exercises

### *Beta Book*

47. Peer group betas are calculated by taking the sales-weighted average of the betas for each industry in which a company has sales.

$$25\% \times 0.60 + 14.75\% \times 1.10 + 60\% \times 0.70 + 0.25\% \times 0.40 = 0.73$$

Or using a tabular form:

| % Sales in industry | Industries OLS beta | Peer group betas |
|---|---|---|
| 25.00% | 0.60 | 0.15 |
| 14.75% | 1.10 | 0.1623 |
| 60.00% | 0.70 | 0.42 |
| 0.25% | 0.40 | 0.001 |
| Peer group beta | | 0.7333 |

48. Using the Vasicek Shrinkage Technique and formula:

Ibbotson (adjusted) beta = (1 – weight) × peer group beta + weight × company beta
Ibbotson (adjusted) beta = (1 – 0.20) × 1.25 + 0.20 × 1.75 = 1 + 0.35 = 1.35

49. The industry risk premium methodology uses the following equation:

$$IRP_{XYZ} = (B_{XYZ} \times ERP) - ERP$$

In our case, $IRP_{XYZ} = (0.90 \times 7.8\%) - 7.8\% = 7.02\% - 7.8\% = -0.78\%$

In this case, because the industry risk premium is negative, we conclude that Industry XYZ is less risky than the market.

50. The easiest way to convert an after-tax capitalization rate to a pretax basis is to divide the after-tax capitalization rate by (1 minus the tax rate).

$$\text{Pretax capitalization rate of Company XYZ} = \frac{\text{After-tax capitalization rate of Company XYZ}}{1 - \text{tax rate}}$$

$$\text{Pretax capitalization rate of Company XYZ} = \frac{15\%}{1 - 35\%} = \frac{15\%}{65\%} = 23\%$$

This process, although not completely accurate, will bring the capitalization rate to an estimated pretax basis.

### *Cost of Capital Yearbook*

51. Small Composite. To determine whether Company XYZ is comparable to the small companies in SIC code 275, we compare the sales and total capital of our company to the sales and total capital of the three smallest companies in the industry reported at the top of the page under Sales and Total Capital.

In our case, $10 million and $8 million are below the averages of the figures for the three smallest companies in SIC code 275, so the Small Composite statistics are a good fit for our company.

52. The cost of equity and WACC estimates are presented at the bottom of Exhibit 13.3. Since we have already established that Company XYZ is a small company, we are going to look at the "Small Composite" row of that section:

| | Cost of Equity Capital % | | | | |
|---|---|---|---|---|---|
| | CAPM | CAPM + size premium | Fama-French three-factor | DCF 1-stage | DCF 3-stage |
| Small Composite | 10.16 | 12.78 | 14.56 | 11.63 | 6.50 |

Also, because we are valuing a very small company, CAPM, adjusted for size and the Fama-French three-factor model, will provide a higher, more realistic cost of equity value. So we are looking at:

| | Cost of Equity Capital % | |
|---|---|---|
| | CAPM + size premium | Fama-French three-factor |
| Small Composite | 12.78 | 14.56 |

The analyst will exercise further judgment to apply these Small Composite estimates to Company XYZ.

53. The WACC formula is:

$$WACC = W_e\, k_c + W_d\, k_d\, (1–t)$$

Where:

$W_d$ and $W_e$ = Market value weights for debt and equity

Because XYZ, as a private company, does not have a market for its securities, one way to apply the WACC is to use the industry-average capital structure as reported in Exhibit 13.3.

The data reported in the "Capital Structure Ratio (%)" section of Exhibit 13.3 allow the analyst to use an industry capital structure in determining the cost of capital for a company without market data.

Using the five-year average debt/total capital ratio for the Small Composite for SIC code 275, we find that the percentage of debt is 43.68% and the percentage of equity is 100 – 43.68% = 56.32%. With all the data available, we can estimate the WACC for Company XYZ:

$WACC_{XYZ} = 56.32\% \times 20\% + 43.68\% \times 10\% = 11.2640\% + 4.3680\% = 15.63\%$ or 0.1563

54. Using the Small Composite price/sales ratio for the last five years of 0.59 and the sales for Company XYZ of $10 million, we write:

$$\frac{P}{Sales} = 0.59$$

Sales XYZ = $10,000,000

$$\frac{P}{\$10,000,000} = 0.59$$

$P$ = $5,900,000

Based on the price/sales ratio for SIC code 275, we estimated a market capitalization equivalent of $5.9 million for Company XYZ.

55. The formula for the cost of equity for Company XYZ using CAPM is:

$$E\,(R_{XYZ}) = R_f + B_{XYZ} \times (RP_m)$$

XYZ is a private company that does not have market data and therefore does not have a beta. For these situations, the industry beta can be used in absence of the company's own beta. Exhibit 13.3 presents levered, raw, and adjusted betas as well as unlevered betas. If we assume that Company XYZ has a capital structure comparable to that of the industry average, we can use the adjusted levered beta for Small Composite group of 0.59:

$$E\,(R_{XYZ}) = 5.6\% + 0.59 \times 7.8\% = 10.20\%$$

56. $B_L = B_u \times [1 + \text{debt/equity}\ (1 - t)]$

$= 0.26 \times [1 + 1.25\ (1 - 40\%)]$
$= 0.26 \times [1 + 0.75]$
$= 0.26 \times 1.75$
$= 0.455$

57. $E\,(R_{octel}) = R_f + B_{octel} \times RP_m$

From Exhibit 13.4, levered raw beta = 0.44, and levered Ibbotson beta = 0.46.

$E\,(R_{octel}) = 5.6\% + (0.44 \times 7.8\%) = 9.03\%$

$E\,(R_{octel}) = 5.6\% + (0.46 \times 7.8\%) = 9.18\%$

58. Adjusted (Ibbotson) beta = (1 – weight) × peer group beta + weight × company beta

Substituting numbers:

$0.46 = (1 - \text{weight}) \times 0.66 + (\text{weight} \times 0.44)$

$0.46 = 0.66 - 0.66\ \text{weight} + 0.44\ \text{weight}$

$0.46 = 0.66 - 0.022\ \text{weight}$

$0.22\ \text{weight} = 0.20$

$\text{weight} = 0.20/0.22 = 0.91$

Because the weight assigned to the company beta is quite high, we can conclude that the company beta estimate had a low standard error and high statistical significance.

# Chapter 14

# Arbitrage Pricing Model

## ANSWERS

### Multiple Choice Questions

1. a
2. b

### True or False Questions

3. True
4. False
5. True
6. False

# PART III
# Other Topics Related to Cost of Capital

# Chapter 15

# Minority versus Control Implications of Cost of Capital Data

## ANSWERS

### Multiple Choice Questions

1. d
2. a
3. d
4. b
5. c
6. c

### True or False Questions

7. True
8. False. It is primarily the cash flows, rather than the discount or capitalization rate, that determine the extent to which the value is control or minority.
9. False. The company must register shares for any public offering, whether initial or secondary.

### Fill-in-the-Blank Questions

10. Synergistic value (also called "strategic value" or "acquisition value")
11. *Mergerstat/Shannon Pratt's Control Premium Study*™

### Exercise

12.

| | | |
|---|---|---|
| Control value | $20.00 | per share |
| Less: Minority discount (20% × $20.00) | 4.00 | |
| Marketable minority value | $16.00 | per share |
| Less discount for lack of marketability (40% × $16.00) | 6.40 | |
| Nonmarketable minority value | $9.60 | per share |

# Chapter 16

# Handling the Discount for Lack of Marketability

## ANSWERS

### Multiple Choice Questions

1. c. There are no "studies" of lack of marketability for controlling interests because there is no benchmark for comparison.
2. c. The *FMV Restricted Stock Study*™ has 243 transactions between 1980 and 1997, with 53 data points for each transaction.
3. c. The *Valuations Advisors' Discount for Lack of Marketability Study*™ has almost all transactions for any year, while the Willamette and Emory studies have stricter filters for transactions, resulting in fewer transactions per year.
4. b
5. c

### True or False Questions

6. False. Investors cherish liquidity and abhor illiquidity. The cost of capital goes down with increasing liquidity.
7. True
8. True
9. True
10. False. In 1990, the SEC loosened reporting requirements and in 1997 it decreased the required holding period under Rule 144 from two years to one year, making restricted stocks more liquid. Closely held interests still represent long-term holdings in most cases.

# Chapter 17

# How Cost of Capital Relates to the Excess Earnings Method of Valuation

## ANSWERS

### Multiple Choice Questions

1. a
2. b

### True or False Question

3. True

### Fill-in-the-Blank Question

4. a. Income attributable to tangible assets

   b. Income attributable to intangible assets

   Note that, in the excess earnings method, the capitalization rates are estimated on the asset side of the balance sheet, while in all other methods discussed in the book, the capitalization rates are estimated on a category of liabilities and/or equity on the right-hand side of the balance sheet.

### Exercises

5. Valuation by the excess earnings method:

| | |
|---|---|
| Net tangible assets | $300,000 |
| Expected net cash flow for coming year | 60,000 |
| Required rate of return on net tangible assets | $0.08 \times \$300,000 = \underline{\$24,000}$ |
| Return attributable to intangible assets ("excess earnings") | 36,000 |
| Intangible asset value (capitalized excess earnings) | $\$36,000 / 0.20 = \underline{\$180,000}$ |
| Value of company by excess earnings method | $\underline{\underline{\$480,000}}$ |

6. Implied capitalization rate:

$$\frac{\$60,000}{\$480,000} = 12.5$$

7. $\frac{\$60,000}{0.18} = \$333,333$ = value by the capitalization of cash flow method

   Therefore, if the 18% capitalization rate is reasonable, the company is overvalued by $146,667 ($480,000 – $333,333) using the excess earnings method.

8. Probable reasons for overvaluation:

   a. Net cash flow estimate could be overly optimistic. One possible reason for this would be the failure to recognize need for capital expenditures and/or additions to working capital, and merely taking EBITDA as net cash flow.

   b. Too low a required return (cost of capital) for net tangible assets. Banks usually charge more than 8% to loan on tangible assets and will not loan 100% of tangible asset value; therefore, the required return on tangible assets must include a cost of equity capital component.

   c. Too low a required return on intangible assets. A 20% required return implies a five-year payback period. Few buyers are willing to accept this.

      Would you pay $180,000 for the "blue sky" in Dad's Repair Co.?

      Many people apply the excess earnings mechanically with no concept of the economic reality of the result.

# Chapter 18

# Common Errors in Estimation and Use of Cost of Capital

## ANSWERS

### Multiple Choice Questions

1. d
2. d. A very common error is to use the acquiring company's cost of capital to evaluate a potential acquisition that is riskier than the acquirer. This adds to the risk of the acquirer, resulting in a reduction of its stock price.
3. c
4. d
5. b
6. c
7. c
8. d
9. a

### True or False Questions

10. True
11. True
12. False. The excess earnings method is based on required returns to categories of assets rather than on required returns to categories of capital.
13. False. It is a common error for analysts to set capital expenditures equal to depreciation in the terminal year. But if a company is expected to grow, capital expenditures should be expected to exceed depreciation. This error leads to an overstatement of expected cash flows and, therefore, an overvaluation of the company.
14. False. The capital structure components should be weighted on the basis of their respective market values, not their book values.
15. True

# Chapter 19

# Cost of Capital in the Courts

## ANSWERS

### Multiple Choice Questions

1. c
2. a
3. a

### True or False Questions

4. False. The U.S. Tax Court has accepted the small stock premium in many cases in which the expert gave evidence that the size of the company warranted such a premium.
5. False. The U.S. Tax Court has addressed the issue of beta in several cases.
6. False. The bankruptcy court interest rate awards have tended to be at the rate that the creditor would charge on loans with similar characteristics.
7. False. Bankruptcy courts frequently have accepted the discounted cash flow method for valuing a company.
8. True
9. True
10. True
11. True. Where experts convince the court that the financial community would value the company by the discounted cash flow method, judges have accepted that method.
12. False. Courts have included the cost of capital in damages awards.

# Chapter 20

# Cost of Capital in Ad Valorem Taxation

## ANSWERS

### Multiple Choice Questions

1. a
2. d

### True or False Questions

3. True
4. True
5. True
6. True

### Exercise

7. 0.10 / (1 – 0.40) = 0.10/0.60 = 16.7% or 0.167

# Chapter 21

# Capital Budgeting and Feasibility Studies

## ANSWERS

### Multiple Choice Questions

1. a
2. c
3. d

### True or False Questions

4. True
5. True

# Chapter 22

# Central Role of Cost of Capital in Economic Value Added

## ANSWERS

### Multiple Choice Questions

1. b
2. b

### True or False Questions

3. True
4. False. The EVA bonus plan ties bonuses to *improvements* in EVA.

### Fill-in-the-Blank Questions

5. a. Increase the return from existing assets.
   b. Invest additional capital so long as the return earned exceeds the cost of the new capital.
   c. Release capital from activities that earn less than their cost of capital.
6. a. A cash bonus plan that simulates ownership.
   b. A leveraged stock option (LSO) that makes ownership real.

### Exercise

7.

| | |
|---|---|
| $0.20 \times \$100$ million = | \$20 million |
| $0.12 \times \$100$ million = | –\$12 million |
| Economic Value Added | \$8 million |

# Appendix

# Data Resources

## ANSWERS

### Multiple Choice Questions

1. a
2. b
3. d

### Fill-in-the-Blank Questions

4. The *Standard & Poor's Corporate Value Consulting (S&P CVC) Risk Premium Report* is available online at Ibbotson's Cost of Capital Center, www.ibbotson.com.
5. Electronic Data, Gathering Analysis Retrieval. EDGAR is the electronic database of SEC filings: 10-Ks, 10-Qs, 8-Ks, and other public company information.
6. Ibbotson Associates' *Stocks, Bonds, Bills, and Inflation*®, either *Classic Edition* or *Valuation Edition Yearbooks*.
7. Ibbotsons Associates' *Cost of Capital Yearbook*
8. a. CompuServe
   b. Ibbotson Associates' *Beta Book*
   c. Ibbotson Associates' Cost of Capital Center
   d. Merrill Lynch Capital Markets
   e. Standard & Poor's COMPUSTAT
   f. *Standard & Poor's Stock Reports*
   g. *Tradeline*
   h. *Value Line Investment Survey*
9. a. *Value Line Investment Survey*
   b. Thompson Financial's *First Call* and *I/B/E/S*
   c. Standard and Poor's ACE (Analysts' Consensus Estimates)
   d. *Zack's Earnings Forecaster*
10. *The Partnership Spectrum* (published by Partnership Profiles, Inc.)

# International Glossary of Business Valuation Terms

*The second edition of the International Glossary of Business Valuation Terms is now out. It contains definitions of 38 additional terms (not in the original edition and denoted here by an asterisk). Definitions of only two terms are changes from the original edition, and the changes are only to clarify the wording, not changing the meaning. The glossary is a joint effort of the American Institute of Certified Public Accountants, the American Society of Appraisers, the Canadian Institute of Chartered Business Valuators, the National Association of Certified Valuation Analysts, and the Institute of Business Appraisers.*

—Shannon Pratt

To enhance and sustain the quality of business valuations for the benefit of the profession and its clientele, the below identified societies and organizations have adopted the definitions for the terms included in this glossary.

The performance of business valuation services requires a high degree of skill and imposes upon the valuation professional a duty to communicate the valuation process and conclusion, in a manner that is clear and not misleading. This duty is advanced through the use of terms whose meanings are clearly established and consistently applied throughout the profession.

If, in the opinion of the business valuation professional, one or more of these terms needs to be used in a manner that materially departs from the enclosed definitions, it is recommended that the term be defined as used within that valuation engagement.

This glossary has been developed to provide guidance to business valuation practitioners by further memorializing the body of knowledge that constitutes the competent and careful determination of value and, more particularly, the communication of how that value was determined.

Departure from this glossary is not intended to provide a basis for civil liability and should not be presumed to create evidence that any duty has been breached.

***Adjusted Book Value Method** A method within the asset approach whereby all assets and liabilities (including off-balance sheet, intangible, and contingent) are adjusted to their fair market values ***[NOTE: In Canada on a going concern basis.]***

***Adjusted Net Asset Method** *See* **Adjusted Book Value Method**.

**Appraisal** *See* **Valuation**.

**Appraisal Approach** *See* **Valuation Approach**.

**Appraisal Date** *See* **Valuation Date**.

**Appraisal Method** *See* **Valuation Method**.

**Appraisal Procedure** *See* **Valuation Procedure**.

***Arbitrage Pricing Theory** A multivariate model for estimating the cost of equity capital, which incorporates several systematic risk factors.

**Asset (Asset-Based) Approach** A general way of determining a value indication of a business, business ownership interest, or security using one or more methods based on the value of the assets net of liabilities.

**Beta** A measure of systematic risk of a stock; the tendency of a stock's price to correlate with changes in a specific index.

**Blockage Discount** An amount or percentage deducted from the current market price of a publicly traded stock to reflect the decrease in the per share value of a block of stock that is of a size that could not be sold in a reasonable period of time given normal trading volume.

*__Book Value__ *See* **Net Book Value**.

**Business** *See* **Business Enterprise**.

**Business Enterprise** A commercial, industrial, service, or investment entity (or a combination thereof) pursuing an economic activity.

*__Business Risk__ The degree of uncertainty of realizing expected future returns of the business resulting from factors other than financial leverage. *See* **Financial Risk**.

**Business Valuation** The act or process of determining the value of a business enterprise or ownership interest therein.

**Capital Asset Pricing Model (CAPM)** A model in which the cost of capital for any stock or portfolio of stocks equals a risk-free rate plus a risk premium that is proportionate to the systematic risk of the stock or portfolio.

**Capitalization** A conversion of a single period of economic benefits into value.

**Capitalization Factor** Any multiple or divisor used to convert anticipated economic benefits of a single period into value.

*__Capitalization of Earnings Method__ A method within the income approach whereby economic benefits for a representative single period are converted to value through division by a capitalization rate.

**Capitalization Rate** Any divisor (usually expressed as a percentage) used to convert anticipated economic benefits of a single period into value.

**Capital Structure** The composition of the invested capital of a business enterprise, the mix of debt and equity financing.

**Cash Flow** Cash that is generated over a period of time by an asset, group of assets, or business enterprise. It may be used in a general sense to encompass various levels of specifically defined cash flows. When the term is used, it should be supplemented by a qualifier (for example, "discretionary" or "operating") and a specific definition in the given valuation context.

*__Common Size Statements__ Financial statements in which each line is expressed as a percentage of the total. On the balance sheet, each line item is shown as a percentage of total assets, and on the income statement, each item is expressed as a percentage of sales.

**Control** The power to direct the management and policies of a business enterprise.

**Control Premium** An amount or a percentage by which the pro rata value of a controlling interest exceeds the pro rata value of a noncontrolling interest in a business enterprise, to reflect the power of control.

**Cost Approach** A general way of determining a value indication of an individual asset by quantifying the amount of money required to replace the future service capability of that asset.

**Cost of Capital** The expected rate of return that the market requires in order to attract funds to a particular investment.

*__Debt-Free__ ***We discourage the use of this term.*** *See* **Invested Capital**.

**Discount for Lack of Control** An amount or percentage deducted from the pro rata share of value of 100% of an equity interest in a business to reflect the absence of some or all of the powers of control.

*__Discount for Lack of Marketability__ An amount or percentage deducted from the value of an ownership interest to reflect the relative absence of marketability.

**Discount for Lack of Voting Rights** An amount or percentage deducted from the per share value of a minority interest voting share to reflect the absence of voting rights.

**Discount Rate** A rate of return used to convert a future monetary sum into present value.

***Discounted Cash Flow Method** A method within the income approach whereby the present value of future expected net cash flows is calculated using a discount rate.

***Discounted Future Earnings Method** A method within the income approach whereby the present value of future expected economic benefits is calculated using a discount rate.

***Economic Benefits** Inflows such as revenues, net income, net cash flows, etc.

**Economic Life** The period of time over which property may generate economic benefits.

**Effective Date** *See* **Valuation Date**.

**Enterprise** *See* **Business Enterprise**.

***Equity** The owner's interest in property after deduction of all liabilities.

**Equity Net Cash Flows** Those cash flows available to pay out to equity holders (in the form of dividends) after funding operations of the business enterprise, making necessary capital investments, and increasing or decreasing debt financing.

**Equity Risk Premium** A rate of return added to a risk-free rate to reflect the additional risk of equity instruments over risk-free instruments (a component of the cost of equity capital or equity discount rate).

**Excess Earnings** That amount of anticipated economic benefits that exceeds an appropriate rate of return on the value of a selected asset base (often net tangible assets) used to generate those anticipated economic benefits.

**Excess Earnings Method** A specific way of determining a value indication of a business, business ownership interest, or security determined as the sum of a) the value of the assets derived by capitalizing excess earnings and b) the value of the selected asset base. Also frequently used to value intangible assets. *See* **Excess Earnings**.

**Fair Market Value** The price, expressed in terms of cash equivalents, at which property would change hands between a hypothetical willing and able buyer and a hypothetical willing and able seller, acting at arms length in an open and unrestricted market, when neither is under compulsion to buy or sell and when both have reasonable knowledge of the relevant facts. ***[NOTE: In Canada, the term "price" should be replaced with the term "highest price."]***

***Fairness Opinion** An opinion as to whether or not the consideration in a transaction is fair from a financial point of view.

***Financial Risk** The degree of uncertainty of realizing expected future returns of the business resulting from financial leverage. *See* **Business Risk**.

**Forced Liquidation Value** Liquidation value, at which the asset or assets are sold as quickly as possible, such as at an auction.

***Free Cash Flow** ***We discourage the use of this term.*** *See* **Net Cash Flow**.

**Going Concern** An ongoing operating business enterprise.

**Going Concern Value** The value of a business enterprise that is expected to continue to operate into the future. The intangible elements of Going Concern Value result from factors such as having a trained work force, an operational plant, and the necessary licenses, systems, and procedures in place.

**Goodwill** That intangible asset arising as a result of name, reputation, customer loyalty, location, products, and similar factors not separately identified.

**Goodwill Value** The value attributable to goodwill.

***Guideline Public Company Method** A method within the market approach whereby market multiples are derived from market prices of stocks of companies that are engaged in the same or similar lines of business, and that are actively traded on a free and open market.

**Income (Income-based) Approach** A general way of determining a value indication of a business, business ownership interest, security, or intangible asset using one or more methods that convert anticipated economic benefits into a present single amount.

**Intangible Assets** Nonphysical assets such as franchises, trademarks, patents, copyrights, goodwill, equities, mineral rights, securities, and contracts (as distinguished from physical assets) that grant rights and privileges, and have value for the owner.

***Internal Rate of Return** A discount rate at which the present value of the future cash flows of the investment equals the cost of the investment.

***Intrinsic Value** The value that an investor considers, on the basis of an evaluation or available facts, to be the "true" or "real" value that will become the market value when other investors reach the same conclusion. When the term applies to options, it is the difference between the exercise price or strike price of an option and the market value of the underlying security.

**Invested Capital** The sum of equity and debt in a business enterprise. Debt is typically a) all interest-bearing debt or b) long-term interest-bearing debt. When the term is used, it should be supplemented by a specific definition in the given valuation context.

**Invested Capital Net Cash Flows** Those cash flows available to pay out to equity holders (in the form of dividends) and debt investors (in the form of principal and interest) after funding operations of the business enterprise and making necessary capital investments.

**Investment Risk** The degree of uncertainty as to the realization of expected returns.

**Investment Value** The value to a particular investor based on individual investment requirements and expectations. ***[NOTE: In Canada, the term used is "Value to the Owner."]***

**Key Person Discount** An amount or percentage deducted from the value of an ownership interest to reflect the reduction in value resulting from the actual or potential loss of a key person in a business enterprise.

**Levered Beta** The beta reflecting a capital structure that includes debt.

***Limited Appraisal** The act or process of determining the value of a business, business ownership interest, security, or intangible asset with limitations in analyses, procedures, or scope.

**Liquidity** The ability to quickly convert property to cash or pay a liability.

**Liquidation Value** The net amount that would be realized if the business is terminated and the assets are sold piecemeal. Liquidation can be either "orderly" or "forced."

**Majority Control** The degree of control provided by a majority position.

**Majority Interest** An ownership interest greater than 50% of the voting interest in a business enterprise.

**Market (Market-Based) Approach** A general way of determining a value indication of a business, business ownership interest, security, or intangible asset by using one or more methods that compare the subject to similar businesses, business ownership interests, securities, or intangible assets that have been sold.

***Market Capitalization of Equity** The share price of a publicly traded stock multiplied by the number of shares outstanding.

***Market Capitalization of Invested Capital** The market capitalization of equity plus the market value of the debt component of invested capital.

***Market Multiple** The market value of a company's stock or invested capital divided by a company measure (such as economic benefits, number of customers).

**Marketability** The ability to quickly convert property to cash at minimal cost.

**Marketability Discount** *See* **Discount for Lack of Marketability**.

*__Merger and Acquisition Method__ A method within the market approach whereby pricing multiples are derived from transactions of significant interests in companies engaged in the same or similar lines of business.

*__Midyear Discounting__ A convention used in the Discounted Future Earnings Method that reflects economic benefits being generated at midyear, approximating the effect of economic benefits being generated evenly throughout the year.

**Minority Discount** A discount for lack of control applicable to a minority interest.

**Minority Interest** An ownership interest less than 50% of the voting interest in a business enterprise.

*__Multiple__ The inverse of the capitalization rate.

**Net Book Value** With respect to a business enterprise, the difference between total assets (net of accumulated depreciation, depletion, and amortization) and total liabilities as they appear on the balance sheet (synonymous with Shareholder's Equity). With respect to a specific asset, the capitalized cost less accumulated amortization or depreciation as it appears on the books of account of the business enterprise.

**Net Cash Flows** When the term is used, it should be supplemented by a qualifier. *See* **Equity Net Cash Flows** and **Invested Capital Net Cash Flows**.

*__Net Present Value__ The value, as of a specified date, of future cash inflows less all cash outflows (including the cost of investment) calculated using an appropriate discount rate.

**Net Tangible Asset Value** The value of the business enterprise's tangible assets (excluding excess assets and nonoperating assets) minus the value of its liabilities.

**Nonoperating Assets** Assets not necessary to ongoing operations of the business enterprise. ***[NOTE: In Canada, the term used is "Redundant Assets."]***

*__Normalized Earnings__ Economic benefits adjusted for nonrecurring, noneconomic, or other unusual items to eliminate anomalies and/or facilitate comparisons.

*__Normalized Financial Statements__ Financial statements adjusted for nonoperating assets and liabilities and/or for nonrecurring, noneconomic, or other unusual items to eliminate anomalies and/or facilitate comparisons.

**Orderly Liquidation Value** Liquidation value at which the asset or assets are sold over a reasonable period of time to maximize proceeds received.

**Premise of Value** An assumption regarding the most likely set of transactional circumstances that may be applicable to the subject valuation; e.g., going concern, liquidation.

*__Present Value__ The value, as of a specified date, of future economic benefits and/or proceeds from sale, calculated using an appropriate discount rate.

**Portfolio Discount** An amount or percentage deducted from the value of a business enterprise to reflect the fact that it owns dissimilar operations or assets that do not fit well together.

*__Price/Earnings Multiple__ The price of a share of stock divided by its earnings per share.

**Rate of Return** An amount of income (loss) and/or change in value realized or anticipated on an investment, expressed as a percentage of that investment.

**Redundant Assets** *See* **Nonoperating Assets**.

**Report Date** The date conclusions are transmitted to the client.

**Replacement Cost New** The current cost of a similar new property having the nearest equivalent utility to the property being valued.

**Reproduction Cost New** The current cost of an identical new property.

*__Required Rate of Return__ The minimum rate of return acceptable by investors before they will commit money to an investment at a given level of risk.

**Residual Value** The value as of the end of the discrete projection period in a discounted future earnings model.

***Return on Equity** The amount, expressed as a percentage, earned on a company's common equity for a given period.

***Return on Invested Capital** The amount, expressed as a percentage, earned on a company's total capital for a given period.

***Return on Investment** *See* **Return on Invested Capital** and **Return on Equity**.

**Risk-Free Rate** The rate of return available in the market on an investment free of default risk.

**Risk Premium** A rate of return added to a risk-free rate to reflect risk.

**Rule of Thumb** A mathematical formula developed from the relationship between price and certain variables based on experience, observation, hearsay, or a combination of these; usually industry specific.

**Special Interest Purchasers** Acquirers who believe they can enjoy post-acquisition economies of scale, synergies, or strategic advantages by combining the acquired business interest with their own.

**Standard of Value** The identification of the type of value being used in a specific engagement; e.g., fair market value, fair value, investment value.

**Sustaining Capital Reinvestment** The periodic capital outlay required to maintain operations at existing levels, net of the tax shield available from such outlays.

**Systematic Risk** The risk that is common to all risky securities and cannot be eliminated through diversification. The measure of systematic risk in stocks is the beta coefficient.

***Tangible Assets** Physical assets (such as cash, accounts receivable, inventory, property, plant and equipment, etc.).

**Terminal Value** *See* **Residual Value**.

***Transaction Method** *See* **Merger and Acquisition Method**.

**Unlevered Beta** The beta reflecting a capital structure without debt.

**Unsystematic Risk** The portion of total risk specific to an individual security that can be avoided through diversification.

**Valuation** The act or process of determining the value of a business, business ownership interest, security, or intangible asset.

**Valuation Approach** A general way of determining a value indication of a business, business ownership interest, security, or intangible asset using one or more valuation methods.

**Valuation Date** The specific point in time as of which the valuator's opinion of value applies (also referred to as "Effective Date" or "Appraisal Date").

**Valuation Method** Within approaches, a specific way to determine value.

**Valuation Procedure** The act, manner, and technique of performing the steps of an appraisal method.

**Valuation Ratio** A fraction in which a value or price serves as the numerator and financial, operating, or physical data serve as the denominator.

**Value to the Owner** ***[NOTE: In Canada, see Investment Value.]***

***Voting Control** *De jure* control of a business enterprise.

**Weighted Average Cost of Capital (WACC)** The cost of capital (discount rate) determined by the weighted average, at market value, of the cost of all financing sources in the business enterprise's capital structure.

# Cost of Capital

***Second Edition***

# Workbook

## CPE SELF-STUDY EXAMINATION

### About the CPE Self-study Examination

| | |
|---|---|
| Prerequisites: | None |
| Recommended CPE credits: | 8 Hours |
| Knowledge level: | Basic |
| Area of study: | Management/Consulting Services |

The credit hours recommended are in accordance with the AICPA Standards for CPE programs. Since CPE requirements are set by each state, you need to check with your State Board of Accountancy concerning required CPE hours and fields of study.

If you decide to take this CPE examination, follow the directions below. This examination fee is $59. Means of payment are shown on the answer form.

The CPE examination is graded no later than two weeks after receipt. The passing score is at least 70%. John Wiley & Sons, Inc. will issue a certificate of completion to successful participants to recognize their achievement.

Photocopy one copy of the answer sheet for each additional participant who wishes to take the CPE examination. Each participant should complete the answer form and return it with the $59 fee.

The enclosed CPE examination will expire on December 31, 2004. Completed exams must be postmarked by that date.

#### *Directions for the CPE Course*

Complete the examination after reading all chapters in *Cost of Capital, Estimation and Applications, Second Edition*. Record your answers by writing a letter (a–e), true, or false on the line for that question on the answer form. Upon completion of the examination, cut out the answer sheet, enclose it in a stamped envelope, and mail to the following address:

CPE Director
John Wiley & Sons, Inc.
7222 Commerce Ctr. Drive
Suite 240
Colorado Springs, CO 80919

Registered with the National Association of State Boards of Accountancy as a sponsor of continuity professional education on the National Registry of CPE Sponsors. State boards of accountancy have final authority on the acceptance of individual courses. Complaints regarding registered sponsors may be addressed to NASBA, 150 Fourth Avenue North, Suite 700, Nashville, TN 37219-2417; (615) 880-4200; fax (615) 880-4292.

## COST OF CAPITAL, *Second Edition* WORKBOOK

### CPE Examination

Record your CPE answers on the answer form provided below and return this page for grading.

*Mail to:*

**CPE Director**

John Wiley & Sons, Inc., 7222 Commerce Center Drive, Suite 240, Colorado Springs, CO 80919

**PAYMENT OPTIONS**

☐ **Payment enclosed ($59.00).**
(Make checks payable to John Wiley & Sons, Inc.)
Please add appropriate sales tax.
*Be sure to sign your order below.*

**Charge my:**

☐ American Express
☐ Master Card
☐ Visa

Account number _____

Expiration date _____
*Please sign below for all credit card orders.*

Signature _____

**NAME** _____

FIRM NAME _____

ADDRESS _____

_____

PHONE (  ) _____

CPA STATE LICENSE # _____

**CPE ANSWERS**

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 1. ____ | 2. ____ | 3. ____ | 4. ____ | 5. ____ | 6. ____ | 7. ____ | 8. ____ | 9. ____ | 10. ____ |
| 11. ____ | 12. ____ | 13. ____ | 14. ____ | 15. ____ | 16. ____ | 17. ____ | 18. ____ | 19. ____ | 20. ____ |
| 21. ____ | 22. ____ | 23. ____ | 24. ____ | 25. ____ | 26. ____ | 27. ____ | 28. ____ | 29. ____ | 30. ____ |
| 31. ____ | 32. ____ | 33. ____ | 34. ____ | 35. ____ | 36. ____ | 37. ____ | 38. ____ | 39. ____ | 40. ____ |

CPE Exam ISBN: 0-471-27341-4

## COST OF CAPITAL, *Second Edition* WORKBOOK

### CPE Feedback

1. Do you agree with the publisher's determination of CPE credit hours? Yes ____ No ____
2. Was the content relevant? Yes ____ No ____
3. Was the content displayed clearly? Yes ____ No ____
4. Did the content enhance your professional competence? Yes ____ No ____
5. Was the content timely and effective? Yes ____ No ____

How can we make the examination/content better? If you have any suggestions, please summarize them in the space below. We will consider them in developing future examinations.

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

# CPE Self-study Examination

## MULTIPLE CHOICE QUESTIONS

1. Which of the following is the most common maturity of U.S. Treasury obligations selected by analysts to represent the risk-free rate?

   a. 30 days

   b. 5 years

   c. 10 years

   d. 20 years

2. Which of the following is NOT a maturity of U.S. Treasury obligations for which Ibbotson publishes a corresponding equity risk premium series?

   a. 30 days

   b. 5 years

   c. 10 years

   d. 20 years

3. Which of the following terms are often (properly) used interchangeably?

   a. Cost of capital, discount rate, and capitalization rate

   b. Cost of capital and discount rate but not capitalization rate

   c. Cost of capital and capitalization rate but not discount rate

   d. Discount rate and capitalization rate but not cost of capital

4. The relevant yield on a debt instrument in calculating a company's cost of capital is:

   a. Either the yield to maturity or the yield-to-call date but not the yield on the face value

   b. Either the yield to maturity or the yield on the face value but not the yield-to-call date

   c. Either the yield on the face value or the yield-to-call date but not the yield to maturity

   d. The yield on the face value, the yield to maturity, or the yield-to-call date

5. Which of the following is a correct statement?

   a. The capitalization rate is the reciprocal of the discount rate.

   b. The capitalization rate is the reciprocal of the growth rate.

   c. To get the capitalization rate, you subtract the long-term growth rate from the discount rate.

   d. To get the capitalization rate, you add the long-term growth rate to the discount rate.

6. Which of the following must be subtracted from EBITDA to compute net cash flow to equity?

   a. Interest (tax-affected), capital expenditures, and additions to working capital

   b. Depreciation, capital expenditures, and additions to working capital

   c. Capital expenditures and additions to working capital but neither interest nor depreciation

   d. Interest (tax-affected), capital expenditures, additions to working capital, and depreciation

7. In the context of estimating the cost of capital, return on an investment generally is considered to have which of the following component or components?

   a. Distributions (dividends or withdrawals)

   b. Gain or loss in value whether realized or unrealized

   c. Both (a) and (b) above

   d. Neither (a) nor (b) above

8. The "risk-free rate" includes which of the following components?

   a. A "real" rate of return and an inflation component

   b. A "real" rate of return and a component for interest rate risk

   c. An inflation component and a component for interest rate risk

   d. All of the above

9. When estimating a control value capital structure for a company with $25 million revenue for the purpose of estimating a weighted average cost of capital (WACC), which of the following is an appropriate source for the percentage of weight allocated to equity and the percentage of weight allocated to debt?

   a. Risk Management Association's (formerly Robert Morris Associates) *Annual Statement Studies*

   b. *Financial Studies of the Small Business*

c. Ibbotson Associates' *Cost of Capital Yearbook*

d. Either (a) or (c) above would be appropriate

10. Cost of capital is required in which of the following applications?

a. Business valuation

b. Project selection

c. Utility rate-setting

d. All of the above

11. Which of the following is NOT an assumption of the Capital Asset Pricing Model (CAPM)?

a. Rational investors seek to hold efficient portfolios—that is, portfolios that are fully diversified.

b. All investors have identical time horizons (i.e., expected holding periods).

c. All investors have identical expectations about such variables as expected rates of return and how capitalization rates are generated.

d. All of the above are assumptions of CAPM.

12. Which of the following is the primary source of takeover premiums for public companies?

a. *Mergerstat Review*

b. *Mergerstat/Shannon Pratt's Control Premium Study*™

c. *HLHZ Control Premium Study*

d. *Pratt's Stats*™

13. Which of the following is the most accepted valuation method or approach by the Delaware Court of Chancery?

a. The market approach

b. The discounted cash flow method

c. The asset approach

d. The market approach and the discounted cash flow method have about equal acceptance.

14. When using the cost of capital to evaluate an investment in a project, the cost of capital that should be used is the:

    a. Company's WACC at the company's current capital structure

    b. Company's WACC at the company's target capital structure

    c. Project's WACC at the outset of the project

    d. Project's WACC at the target capital structure over the life of the project

15. In the Stern Stewart & Co. version of EVA (economic value added), leveraged stock options are:

    a. Bought, not granted; "in the money" rather than "out of the money"; and exercisable at a fixed price

    b. Granted, not bought; "in the money" rather than "out of the money"; and exercisable at a price that increases based on the cost of capital.

    c. Bought, not granted; "in the money" rather than "out of the money"; and exercisable at a price that increases based on the cost of capital.

    d. Bought, not granted; "out of the money" rather than "in the money"; and exercisable at a price that increases based on the cost of capital.

16. Which of the following are Ibbotson Associates publications?

    a. *Stocks, Bonds, Bills, and Inflation, Cost of Capital Yearbook,* and COMPUSTAT

    b. *Stocks, Bonds, Bills, and Inflation,* COMPUSTAT, and the *Beta Book*

    c. *Stocks, Bonds, Bills, and Inflation, Cost of Capital Yearbook,* and the *Beta Book*

    d. *Cost of Capital Yearbook,* COMPUSTAT, and the *Beta Book*

17. Which of the following models for estimating the cost of capital does NOT explicitly incorporate a "risk-free" rate?

    a. Build-up model

    b. Capital Asset Pricing Model (CAPM)

    c. Discounted cash flow (DCF) model

    d. Arbitrage pricing theory (APT) model

For questions 18 and 19, the following are known about Company ABC:

| | |
|---|---|
| Cost of debt on an after-tax basis: | 6% |
| Cost of common equity capital: | 20% |
| Debt at market value: | $500,000 |
| Equity at market value: | $750,000 |
| Debt at book value: | $500,000 |
| Equity at book value: | $500,000 |
| Tax rate for ABC: | 40% |

18. The weighted average cost of capital for Company ABC equals:

    a. 13.44%

    b. 14.40%

    c. 11.80%

    d. 13.00%

19. The cost of debt before tax or the pretax cost of debt for Company ABC equals:

    a. 2.4%

    b. 3.6%

    c. 10%

    d. 15%

For questions 20 and 21, the following are known about private Company XYZ:

| | |
|---|---|
| Estimated net cash flow to all invested capital for next 12 months: | $350,000 |
| Expected growth rate in perpetuity for net cash flow: | 5.5% |
| Estimated weighted average cost of capital: | 16% |
| The market value of debt: | $1,500,000 |

20. The basic capitalization model yields which of the following values for Company XYZ's overall capital?

    a. $3,333,333.33

    b. $6,363,636.36

    c. $2,187,500.00

    d. $9,375,000.00

21. The estimated market value of equity for Company XYZ equals:

    a. $4,863,636.36

    b. $7,875,000.00

    c. $687,500.00

    d. $1,833,333.33

22. Beta is a measure of what type of risk?

    a. Systematic

    b. Unsystematic

    c. Maturity

    d. Financial

23. Which of the following is a multivariable model that utilizes multiple regression analysis to estimate the cost of equity capital?

    a. Build-up model

    b. Capital Asset Pricing Model (CAPM)

    c. Discounted cash flow (DCF) model

    d. Arbitrage pricing model

24. Which of the following is/are an accurate statement(s) about discounts for lack of marketability?

    a. Both restricted stock studies and pre-IPO studies have resulted in consistent discounts for lack of marketability over the years.

    b. Restricted stock studies showed lower discounts for lack of marketability since the SEC loosened reporting and trading restrictions in 1990.

    c. Restricted stock studies have always indicated lower discounts than pre-IPO studies.

    d. Both (b) and (c) are accurate statements.

25. If an acquiring company uses its own cost of capital to evaluate a potential acquisition, the result is:

    a. Fair market value

    b. Fair value

c. Investment value

d. Intrinsic value

## TRUE OR FALSE QUESTIONS

26. As risk goes up, the cost of capital goes down. True False

27. In the United States, the discount rate usually is stated in nominal terms. True False

28. The primary difference between the build-up model and the Capital Asset Pricing Model is the use of beta in the CAPM. True False

29. The cost of capital is equal to the discount rate. True False

30. The measure of net cash flow that should be discounted in the DCF model is the cash flow that is the weighted average (expected value) of the probability distribution of possible outcomes. True False

31. Because the discount rate in the income approach is derived from public company stock trades, which are, by definition, minority interests, the result of a discounted cash flow valuation method is a minority interest value. True False

32. In ad valorem taxation, the statutory or regulatory measure of economic income to be discounted or capitalized is most likely net cash flow, or some variation of it. True False

33. Ibbotson Associates recommends that the beta-adjusted size premia data developed in its *SBBI Valuation Edition* be used only when the Capital Asset Pricing Model (CAPM) is being used. True False

34. Betas for private (closely held) companies are directly observable in the market. True False

35. There is empirical evidence to help quantify the size effect in terms of its impact on cost of equity capital. True False

36. *Mergerstat/Shannon Pratt's Control Premium Study*™ is the primary source of control premiums paid in takeovers of public companies. True False

37. When evaluating a potential project, the company's overall cost of capital should be used to discount the project's expected cash flow to a present value. True False

38. The blended capitalization rate from tangible and intangible assets in the excess earnings method should approximately equal the capitalization rate as developed by subtracting the growth rate from the discount rate using the build-up method or CAPM. True False

39. When estimating a company's weighted average cost of capital (WACC), the components should be weighted by their respective book values. True False

40. Bankruptcy courts have not yet used cost of capital to value companies. True False

# Index

*This index has been prepared to help the reader who would like to strengthen his or her grasp of a particular aspect of cost of capital. To that end, the questions have all been indexed by topic, so a reader desiring to work through questions only on a particular subject matter can easily find the relevant questions. To avoid confusing readers, only the questions—not the answers—are indexed.*

*The format is simple: Entries are indexed both to broader page references as well as to specific questions on particular pages. For example, an index entry followed by the numbers 23-25 means that the subject of that entry can be found in several questions over those pages. An index entry followed by 31-Q4 means that the subject of that entry can be found on page 31 in question 4.*

*Of course, the answers should be consulted in conjunction with working through the subject questions.*