CORPORATE FINANCE FOR ENGINEERS

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COURSE OBJECTIVES

By the end of this course the student should be able to:

- **CO1 –** Read and understand the financial statements: Balance sheet, Income statement and cash flows statement.

- **CO2–** Assess corporate financial risk

- **CO3-** Evaluate the profitability of an investment

- **CO4-** Choose the best financing method for an investment

COURSE SYLLABUS

- **Chapter I:** Introducing financial statement
- **Chapter II:** Financial analysis
- **Chapter III:** Time value of money and capital budgeting
- **Chapter IV:** Cost of capital

CHAPTER I: INTRODUCING FINANCIAL STATEMENT

Section I: Balance sheet

Section II: Income statement

Section III: Statement of retained earning

Section IV: Statement of cash flows

Section V: Financial report

✖ <u>Accounting</u> - a process of identifying, recording, summarizing, and reporting economic information to decision makers in the form of <u>financial statements</u>

✖ <u>Financial accounting</u> - focuses on the specific needs of decision makers external to the organization, such as stockholders, suppliers, banks, and government agencies

FINANCIAL ANALYSIS

✖ Assessment of the firm's past, present and future financial conditions

✖ Identification of firm's financial strengths and weaknesses

✖ Primary Tools:

+ Financial Statements

+ Comparison of financial ratios to past, industry, sector and all firms

FINANCIAL STATEMENT

Accountants answer these primary questions with three major financial statements.

- ✖ <u>Balance Sheet</u> - financial picture on a given day

- ✖ <u>Income Statement</u> - performance over a given period

- ✖ <u>Statement of Cash Flows</u> – cash movements over a given period

THE BALANCE SHEET

Sections of the balance sheet:

* Assets – property rights or receivables that are expected to increase or cause future cash flows.

* Liabilities - obligations of the firm to outsiders or claims against its assets by outsiders (debts of the firm)

* Owners' Equity – Ownership interest in a corporation in the form of common stock or preferred stock .

THE BALANCE SHEET EQUATION

The balance sheet equation:

Assets = Liabilities + Owners' Equity

or

Owners' Equity = Assets - Liabilities

ABC Balance Sheet

Assets	year 1	year0
Current assets		
Cash	$ 400	$300
Marketable securities	600	200
Account receivable	400	500
Inventories	600	900
Total current assets	$ 2000	$ 1900
Gross fixed assets (at cost)		
Land and buildings	$ 1200	$ 1050
Machinery and equipment	850	800
Furniture	300	220
Vehicles	100	80
Other	50	50
Total gross fixed assets (at cost)	$ 2500	$ 2200
Less: Accumulated depreciation	1300	1200
Net fixed assets	$ 1200	$ 1000
Total assets	$ 3200	$ 2900

ASSETS

Two types of assets

✖ Current assets: assets that could be converted to cash in less than one year.

✖ Fixed assets: A long-term piece of property that a firm owns and uses in the production of its income and is not expected to be consumed or converted into cash any sooner than at least one year's time.

FIXED ASSETS

+ Intangible assets :Intangible assets: are defined as identifiable non monetary assets that cannot be seen, touched or physically measured, which are created through time, such as , copyrights, patents, and trademarks and competitive intangibles such as knowledge activities (know-how, knowledge).

+ Tangible assets: a physical fixed asset, such as property, plant, equipment, land, furniture, vehicles, equipment …

CURRENT ASSETS

1/Cash

2/Marketable securities: Security that probably could be converted into cash quickly and easily. Such as quoted **securities** will generally have highly liquid markets

3/Accounts receivable: Money which is owed to company by customers for products and services provided on credit

4/ others receivables such as tax or social receivables

CURRENT ASSETS (2)

5/Inventories: such as raw material stock,finished product stock, goods

6/Accruals: such as deferred expenses. Prepaid expense is expense paid in advance but which has not yet been incurred. Ex: ABC LTD pays advance rent to its landowner of $10,000 on 31st December 2020 in respect of office rent for the following year .

ABC Balance Sheet

Liabilities and stockholders' equity	year1	year0
Current liabilities		
Accounts payable	$ 700	$ 500
Notes payable	600	700
Accruals	100	200
Total current liabilities	$ 1400	$ 1400
Long-term debt	$ 600	$ 400
Total liabilities	$ 2000	$ 1800
Stockholders' equity		
Common stock	$ 600	$ 600
Retained earnings	600	500
Total stockholders' equity	$ 1200	$ 1100
Total liabilities and stockholders' equity	**$ 3200**	**$ 2900**

LIABILITIES

- Current liabilities: item which equals the sum of all money owed by a company and due within one year, also called payables or current debt.

- Non current liabilities: debt due for more than one year (residual term of the debt more than one year) and provisions

CURRENT LIABILITIES

1/ Payables : such as account payables (due to providers), tax payables (due to fiscal administration), social payables (due to salaries)…

2/ Financial payables : a debt with a residual term lower than one year owed by a financial institution.

3/ Accruals: such as deferred revenues. Prepaid income is revenue received in advance but which is not yet earned. ABC LTD receives advance rent from its tenant of $10,000 on 31st December 2020 in respect of office rent for the following year.

STOCKHOLDER'S EQUITIES

- Common stocks: ordinary shares

- Preferred stocks:Capital stock which provides a specific dividend that is paid before any dividends are paid to common stock holders, and which takes precedence over common stock in the event of a liquidation

- Retained earning: part of the earnings dedicated to investments and debt principal payments

IN CLASS: QUESTIONS ABOUT ABC'S BALANCE SHEET

- ✖ 1/ Is the amount of cash optimal?

- ✖ 2/ Are the net fixed assets at a high level?

- ✖ 3/ Identify the activity of the firm

- ✖ 4/ Does the firm have enough equities?

Income Statement

Provide a financial summary of the operating results *during a specified period*

ABC Corporation Income Statement for the year 1

Income statement	year 1
sales revenue	1700
cost of goods sold	1000
Gross profit	
Operating expenses	
selling expenses	80
general and administrative expenses	150
depreciation	100
total operating expenses	330
operating profit	
interest expenses	70
Net Profit before taxes	
taxes (tax rate=40%)	
Net Profit after taxes	

INTERMEDIARY RESULTS

- Gross profit=sales revenues – cost of goods sold
  - Cost of goods sold = direct costs associated with making the product such as cost of raw material and labour
- Operating profit=Gross profit –selling expenses –general and administative expenses-depreciation
  - selling expenses:associated to distribution, marketing and selling a product or service
  - General and administative: are expenses not directly linked to a function such as adminsitrative wages, utilities, insurance, consulting fees, rent….
- Net profit before taxes = operating profit-interest expenses
  - Interest expenses=outsatnding debt* interest rate
- Net profit after taxes= Net profit before taxes –taxes
  - Taxes = Net profit before taxes *tax rate

COMPUTE THE GROSS, OPERATING PROFIT , NET PROFIT BEFORE AND AFTER TAXES FOR ABC

Income Statement

Provide a financial summary of the operating results *during a specified period*

ABC Corporation Income Statement for the year 1

Income statement	year 1
sales revenue	1700
cost of goods sold	1000
Gross profit	700
Operating expenses	
selling expenses	80
general and administrative expenses	150
depreciation	100
total operating expenses	330
operating profit	370
interest expenses	70
Net Profit before taxes	300
taxes (tax rate=40%)	120
Net Profit after taxes	180

QUESTIONS ABC'S INCOME STATEMENT

- 1/ Is the firm highly profitable?
- 2/ What about the COGS?
- 3/ What about the selling expenses?
- 3/ What about the firm's financial debt and the interest rate level?

Statement of Retained Earning

Reconciles the net income earned during a given year, and any cash dividends paid, with the change in retained earnings between the start and end of that year

ABC Corporation Statement of Retained Earnings for the end year 1

Retained earnings balance (January 1, year1)	$500
Plus: Net Profit after taxes (for year1)	180
Less: Cash dividend (paid during year1)	
Common stock	(80)
Retained earnings balance (Dec 31, year1)	$600

RETAINED EARNING

- ✖ Two cases

- ✖ Positive result = net profit

  - ✚ Net profit is affected for part to retained earning and for a part to dividend for common or preffered stock

- ✖ Negative result= loss

  - ✚ Loss is affected to retained earning of the next year

CASH FLOW STATEMENT

* Three activities:

* The operating activities: beginning with the purchasing of raw materials and ending with the selling of products dealing with the increase or decrease of non financial current assets and current liabilities (inventories,payables, receivables...)

* The investing activities : with the increase and decrease of fixed assets

* The financial activities: with the increase or decrease of financial payables ,long term , equities and payment of dividends

CASH FLOW STATEMENT

- ✖ Result = Variation of cash during two periods
- ✖ Cash = Working capital –working capital needs
- ✖ Working capital needs =current assets (cash exluded)- current liabilities
- ✖ Working capital= permanent funds –fixed assets
  - ✚ Permanent funds = equities +long term debt

CASH FLOW STATEMENT

× Cash flow from operating activities is related to the working capital needs elements

× Cash flow from operating activities =

Net profit (from income statement)

+Depreciation (from income statement)

-Increase or +decrease of current assets (except cash and marketable securities)

+Increase or - decrease of current liabilities

CASH FLOW STATEMENT

✖ Cash flow fom financing activities=

  +increase in notes payables/-decrease in notes payables

  +increase in long term/-decrease in long term debt

  +increase in equities/- decrease in equities

  - dividend paid

✖ Cash flow from investment activities=

  +decrease in gross fixed assets

  - increase in gross fixed assets

✖ Net cash and marketable securities = Cash flow from operating activities + Cash flow fom financing activities+ Cash flow from investment activities

CASH FLOW STATEMENT: EXERCISE

✖ Construct the cash flow statement for the ABC company for year 0 to year 1 and deduce the net cash flow variation during this period.

Statement of Cash Flows

Cash Flow from Operating Activities
    Net Profits after taxes $ 180
    Depreciation   100
    Decrease in account receivable   100
    Decrease in inventories   300
    Increase in account payable   200
    Decrease in accruals   (100)
      Cash provided by operating   780
Cash Flow from investment activities
    Increase in gross fixed asset   300
      Cash used for investment activities   *(300)*
Cash Flow from financing Activities
    Decrease in notes payable   (100)
    Increase in long-term debts   200
    Changes in stockholders' equity   0
    Dividends paid   (80)
      Cash provided by financing activities   20
    Net increase in cash and marketable securities   **500**

The Stockholders' annual Report

A Stockholder's report summarizes and documents a publicly held corporation's financial activities over the year. <u>Who</u> receives theses reports? <u>What types</u> of informastion do you think they typically include? <u>Why</u> are they important?

1. Regulator or Goverments
2. Creditor (lenders)
3. Owners
4. Management

1. *<u>The letter to stockholders</u>* Events, management philosophy, strategy, and action
2. *Financial statements* (a) the income statement, (b) the balance sheet, (c) the statement of retained earnings, and (d) the statements of cash flows
3. *Other feature*

An important vehicle *for influencing* owners' perceptions of the company and its *future outlook*.

The stockholders' report may *effect expected risk, return, stock price, and the viability of the firm*

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The Stockholders' annual Report

✖ The annual report usually includes:

+ a letter from corporate management

+ a discussion and analysis of recent economic events by management

+ footnotes that explain many elements of the financial statements in more detail

+ the report of the independent auditors

+ a statement of management's responsibility for preparation of the financial statements

+ other corporate information

WHERE TO FIND FINANCIAL STATEMENTS AND ANNUAL REPORTS?

1/ Quoted firms:

-Financial statement:

the stock market website if listed

Example: Nasdaq (www.nasdaq.com) quotes and research ; fundamentals

× Investing: https://www.investing.com

-Annual report: on the firm website

Example: Intel (www.intc.com)

Filing & reports ; annual report (annual report to security holders)

2/ Non quoted firms: on the firm website

IN CLASS ACTIVITY

- ✖ Go to https://www.investing.com /
- ✖ Enter GM ticker (General Motors)
- ✖ Select financials
- ✖ Select income statement (annual)
- ✖ Read and analyze the income statement
- ✖ Select balance sheet (annual)
- ✖ Read and analyze the balance sheet
- ✖ Select cash flow statement (annual)
- ✖ Read and analyze the cash flow statement

GM BALANCE SHEET

- **goodwill** : difference between the cost of the acquisition and the net fair value

- **Fair value :** the price that would be received to sell an asset or paid to transfer a liability in an orderly transaction between market participants at the measurement date

- **Capital lease obligations:** the amount due within a year of balance sheet date for long-term asset lease agreements that look economically similar to asset purchases. Capital lease is a part of fixed assets

- **Additional paid-in capital** is the excess amount paid by an investor over the par value of a stock issue

- **Treasury stocks** (also known as treasury shares) are the portion of shares that a company keeps in its own treasury.

- **Other equity**, such as unrealized gains or losses on hedge/derivative financial instruments and foreign currency transaction gains or losses.

- **ESOP (Employee Stock Ownership Plan)** is an employee benefit plan that enables employees to own part or all of the company they work for. at fair market value

- **Minority interest :** share in a subsidiary company, owned by a party other than the holding company.

CHAPTER II: FINANCIAL ANALYSIS

OVERVIEW

Section 1: Standardized Financial Statements

Section 2: Ratio Analysis

Section 3: Scoring analysis

KEY CONCEPTS AND SKILLS

+ How to standardize financial statements for comparison purposes

+ How to compute and interpret important financial ratios

+ The determinants of a firm's profitability and growth

Understand the problems and pitfalls in financial statement analysis

WHY EVALUATE FINANCIAL STATEMENTS?

✖ Internal uses
- ➕ Performance evaluation – compensation and comparison between divisions
- ➕ Planning for the future – guide in estimating future cash flows

✖ External uses
- ➕ Creditors
- ➕ Suppliers
- ➕ Customers
- ➕ Stockholders

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COMPARATIVE ANALYSIS

Three types of comparisons increase the decision usefulness of financial information:

✖ **Intracompany basis:** Comparisons within a company are often useful to detect changes in financial relationships and significant trends.

✖ **Industry averages:** Comparisons with industry averages provide information about a company's relative position with the industry.

✖ **Intercompany basis:** Comparisons with other companies provide insight into a company's competitive position.

COMPARATIVE ANALYSIS

Two basic tools are used in financial statement analysis to highlight the significance of financial statement data:

- ✖ Common size analysis

- ✖ Ratio analysis

SECTION 1: COMMON SIZE ANALYSIS

COMMON SIZE FINANCIAL STATEMENTS

* Common-Size Balance Sheets
  + All accounts = percent of total assets (%TA)
* Common-Size Income Statements
  + All line items = percent of sales or revenue (%SLS)
* Standardized statements are useful for:
  + Comparing financial information year-to-year
  + Comparing companies of different sizes, particularly within the same industry

PRUFROCK CORPORATION
Balance Sheets as of December 31, 2009 and 2010
($ in millions)

	2009	2010
Assets		
Current assets		
Cash	$ 84	$ 98
Accounts receivable	165	188
Inventory	393	422
Total	$ 642	$ 708
Fixed assets		
Net plant and equipment	$2,731	$2,880
Total assets	$3,373	$3,588
Liabilities and Owners' Equity		
Current liabilities		
Accounts payable	$ 312	$ 344
Notes payable	231	196
Total	$ 543	$ 540
Long-term debt	$ 531	$ 457
Owners' equity		
Common stock and paid-in surplus	$ 500	$ 550
Retained earnings	1,799	2,041
Total	$2,299	$2,591
Total liabilities and owners' equity	$3,373	$3,588

CONSTRUCT THE COMMON SIZE BALANCE SHEET AND MAKE INTERPRETATION

TABLE 3.2

PRUFROCK CORPORATION
Common-Size Balance Sheets
December 31, 2009 and 2010

	2009	2010	Change
Assets			
Current assets			
Cash	2.5%	2.7%	+ .2%
Accounts receivable	4.9	5.2	+ .3
Inventory	11.7	11.8	+ .1
Total	19.1	19.7	+ .6
Fixed assets			
Net plant and equipment	80.9	80.3	− .6
Total assets	100.0%	100.0%	.0%
Liabilities and Owners' Equity			
Current liabilities			
Accounts payable	9.2%	9.6%	+ .4%
Notes payable	6.8	5.5	− 1.3
Total	16.0	15.1	− .9
Long-term debt	15.7	12.7	− 3.0
Owners' equity			
Common stock and paid-in surplus	14.8	15.3	+ .5
Retained earnings	53.3	56.9	+ 3.6
Total	68.1	72.2	+ 4.1
Total liabilities and owners' equity	100.0%	100.0%	.0%

PRUFROCK CORPORATION
2010 Income Statement
($ in millions)

Sales	$2,311
Cost of goods sold	1,344
Depreciation	276
Earnings before interest and taxes	$ 691
Interest paid	141
Taxable income	$ 550
Taxes (34%)	187
Net income	$ 363

Dividends	$121	
Addition to retained earnings	242	

Common stock and paid-in surplus	$ 500	$ 550
Retained earnings	1,799	2,041
Total	$2,299	$2,591
Total liabilities and owners' equity	$3,373	$3,588

TABLE 3.4

PRUFROCK CORPORATION
Common-Size Income Statement
2010

Sales		100.0%
Cost of goods sold		58.2
Depreciation		11.9
Earnings before interest and taxes		29.9
Interest paid		6.1
Taxable income		23.8
Taxes (34%)		8.1
Net income		15.7%
Dividends	5.2%	
Addition to retained earnings	10.5	

SECTION 2: RATIO ANALYSIS

RATIO ANALYSIS

* Allow for better comparison through time or between companies

* Used both internally and externally

* For each ratio, ask yourself:

  + What the ratio is trying to measure ?

  + Why that information is important ?

CATEGORIES OF FINANCIAL RATIOS

✖ <u>Liquidity ratios</u> or Short-term solvency

✖ <u>Financial leverage ratios</u> or Long-term solvency ratios

✖ <u>Efficiency ratios and turn over ratios</u>

✖ <u>Profitability ratios</u>

✖ <u>Cash ratios: Net working capital, net working capital needs, net cash position</u>

✖ <u>Market value ratios</u>

TABLE 3.5   Common financial ratios

I. Short-term solvency, or liquidity, ratios

$$\text{Current ratio} = \frac{\text{Current assets}}{\text{Current liabilities}}$$

$$\text{Quick ratio} = \frac{\text{Current assets} - \text{Inventory}}{\text{Current liabilities}}$$

$$\text{Cash ratio} = \frac{\text{Cash}}{\text{Current liabilities}}$$

II. Long-term solvency, or financial leverage, ratios

$$\text{Total debt ratio} = \frac{\text{Total assets} - \text{Total equity}}{\text{Total assets}}$$

$$\text{Debt-equity ratio} = \text{Total debt}/\text{Total equity}$$

$$\text{Equity multiplier} = \text{Total assets}/\text{Total equity}$$

$$\text{Times interest earned ratio} = \frac{\text{EBIT}}{\text{Interest}}$$

$$\text{Cash coverage ratio} = \frac{\text{EBIT} + \text{Depreciation}}{\text{Interest}}$$

III. Asset utilization, or turnover, ratios

$$\text{Inventory turnover} = \frac{\text{Cost of goods sold}}{\text{Inventory}}$$

$$\text{Days' sales in inventory} = \frac{365 \text{ days}}{\text{Inventory turnover}}$$

$$\text{Receivables turnover} = \frac{\text{Sales}}{\text{Accounts receivable}}$$

$$\text{Days' sales in receivables} = \frac{365 \text{ days}}{\text{Receivables turnover}}$$

$$\text{Total asset turnover} = \frac{\text{Sales}}{\text{Total assets}}$$

$$\text{Capital intensity} = \frac{\text{Total assets}}{\text{Sales}}$$

IV. Profitability ratios

$$\text{Profit margin} = \frac{\text{Net Income}}{\text{Sales}}$$

$$\text{Return on assets (ROA)} = \frac{\text{Net income}}{\text{Total assets}}$$

$$\text{Return on equity (ROE)} = \frac{\text{Net income}}{\text{Total equity}}$$

$$\text{ROE} = \frac{\text{Net income}}{\text{Sales}} \times \frac{\text{Sales}}{\text{Assets}} \times \frac{\text{Assets}}{\text{Equity}}$$

V. Market value ratios

$$\text{Price-earnings ratio} = \frac{\text{Price per share}}{\text{Earnings per share}}$$

$$\text{Price-sales ratio} = \frac{\text{Price per share}}{\text{Sales per share}}$$

$$\text{Market-to-book ratio} = \frac{\text{Market value per share}}{\text{Book value per share}}$$

LIQUIDITY RATIOS

- Liquidity ratios
  - Current ratio must be > 1 (see also NWC)
  - Quick ratio can be <1 (current liabilities unable to finance all the current assets inventories excluded)
  - Cash ratio would be close to 0
  - Question:
  - Compute liquidity ratios for PRUFROCK

LONG TERM SOLVENCY RATIOS

✖ **Long term solvency:**

 ✚ Total debt ratio must be < 70% (banking norm)

 ✚ Debt to equity ratio (financial leverage ratio) must be <2,33

 ✚ Equity multiplier must be < 3,33

 ✚ Time interest earned ratio: expresses EBIT in interest's years (> 20 years)

 ✚ Question:

 ✚ Compute long term solvency ratios for PRUFROCK

EFFICIENCY AND TURN OVER RATIOS

- **Efficiency ratios**
  - Revenues/employees
  - Net income/employees
  - Fixed assets/employees
- **Turn over ratios**
  - Day's sales in inventory =(365*inventory/sales)
    - represents in the case of finished goods the time flow and in the case of raw materials the procurement time
  - Day's sales receivables: =(365*account receivables/sales)
    - represents the payment period for customers
  - Day's purchases payables =(365*account payables/COGS)
    - represents the payment period for suppliers

PROFITABILITY RATIOS:

× Profitability ratios:
  + Profit margin : from few percent to > 20% for highly profitable firms.All these ratios have to be compared to benchmark (sector ratios)
  + Gross margin =gross profit /sales
    × <50% for manufacturing firm
  + Research devlopmement/sales
  + Depreciation/sales: must lower than 5% otherwise the firm is overdimensioned
  + Interest expenses/sales: must lower than 5% otherwise the firm is considered risky
  + ROE
  + ROA

CASH RATIOS

* Net working capital =permanent funds- net fixed assets
* Net working capital=current assets –current liabilities
* Net working capital needs = (current assets –cash and equivalent)-(current liabilities-notes payables or financial payables)
* Net working capital needs (days)=365*NWCN/sales
* Net cash position = Net working capital - Net working capital needs
* Net cash position= cash and equivalent – (notes payables or financial payables)
* Net cash position (days)= 365* Net cash position /sales

CASH RATIOS INTERPRETATION

1/ Net working capital (NWC) must be > 0 in order to guarantee the financial equilibrium of a firm.In such a case, the permanent funds are able to finance the fixed assets and part of the current assets.

2/ Net working capital needs (NWCN) can be either positive or negative.

　　　*NWCN>0 it represents a capital need

　　　*NWCN<0 it represents a capital resource

CASH RATIOS (CONTINUED)

✖ *NWCN>0 it represents a capital needs, means that the current liabilities (financial ones excluded) are financing just a part of the current assets (inventories and receivables).In that case, the reliquat have to be financed by either, permanent funds or financial payables.

✖ *NWCN<0 it represents a capital resource, means that the current liabilities (financial ones excluded) are financing all of the current assets (inventories and receivables).

CASH RATIOS (CONTINUED)

- Net cash position (days) between 5 and 10 days to be optimal

- Net cash position (NCP) can be either positive or negative.
  - NCP>0,
    - Case 1: NWC >0 and NWCN>0: means that the permanent funds are financing all the fixed assets and the part of the current assets non covered by current liabilities and the excess of permanent funds is represented by cash.
    - Case 2: NWC <0 and NWCN<0: means that the current liabilities are financing all of the current assets and all of the fixed assets not covered by permanent funds and the resource in excess is represented by cash

CASH RATIOS (CONTINUED)

NCP<0,

- Case 1: NWC >0 and NWCN>0: means that the permanent funds are financing all the fixed assets and a part of the current assets non covered by current liabilities.The other part of current assets is financed by financial liabilties.

- Case 2: NWC <0 and NWCN<0: means that the current liabilities are financing all of the current assets and part of the fixed assets not covered by permanent funds.The other part of fixed assets is financed by financial liabilities

MARKET RATIOS

✖ Market ratios:

➕ PER: expresses the price (per share) in years of earning (per share).It shows the price's expensiveness.An investor must buy stocks with low PER.

➕ Price sales ratio substitutes PER for deficitary firms (used for internet based firms)

➕ Price to book value ratio: book value =Total assets excluding no value ones –Total debts.An investor have to buy firms with PTB ratio <1 (undervalued firm)

MARKET VALUE RATIOS

✖ Market Price = $88 per share = PPS

✖ Shares outstanding = 33 million

WHY EVALUATE FINANCIAL STATEMENTS?

- **Internal uses**
  - Performance evaluation – compensation and comparison between divisions
  - Planning for the future – guide in estimating future cash flows
- **External uses**
  - Creditors
  - Suppliers
  - Customers
  - Stockholders

FINANCIAL ANALYSIS TYPES

✖ Sector analysis: Ratios need to be compared to a benchmark (sector ratios)

✖ Market analysis : ratios compared to those of other listed companies within the same market or the same industry

✖ Time-Trend Analysis

  ✛ How the firm's performance is changing through time

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PROBLEMS WITH FINANCIAL ANALYSIS

- Conglomerates
  - No readily available comparables
- Global competitors
- Start up firms
- Different accounting procedures
- Different fiscal year ends
- Differences in capital structure
- Seasonal variations and one-time events

EXAMPLE: WORK THE WEB

1/ Click on https://www.readyratios.com/sec/industry/

Choose a company and enter its ticker symbol (for example GM)

2/Click on www.investing.com

✖ Choose a company and enter its ticker symbol (for example GM)

  ✚ Click on "Ratios" to compare the firm to its industry

SECTION 3: CREDIT SCORING MODELS

CREDIT SCORING MODELS

✖ Credit Scoring Models use data on observed borrower characteristics either to calculate the probability of default or to sort borrowers into different default risk classes.

✖ By selecting and combining different economic and financial borrower characteristics, a financial institution manager may be able to:

+ 1.   Numerically establish which factors are important in explaining default risk;

+ 2.   Evaluate the relative degree or importance of these factors

+ 3.   Improve the pricing of default risk;

+ 4.   Be better able to screen out bad loan applicants;

CREDIT SCORING MODELS

<u>Linear Probability Model</u>:

✖ Uses past data as input into a model to explain repayment experience on old loans:

✖ $$Z_i \; = \; \Sigma \beta_j \; X_{i,j} \; + \; \varepsilon_i$$

✖ The relatively important factors used in explaining past repayment performance are then used to forecast repayment probability on new loans.

✖ $$\hat{Z}_i \; = \; \Sigma \beta_j \; \hat{X}_{i,j} \; + \; \varepsilon_i$$

✖ The expected Z value can be interpreted as the probability of default.

✖ $$E(\hat{Z}_i) = 1 - P_i.$$

CREDIT SCORING CONSTRUCTION

- 1/ construct two sub samples for corporate firms:

- -subsample 1: default firms

- -subsample 2:non default firms

- 2/ Gather financial ratios for all firms over 3 or 5 years and compute the average ratios over the period

- 3/ carry out a discriminant or logistic analysis in order to identify the ratios able to separate both subsamples and to build a credit scoring for the corporate firm

ALTMAN MODEL

- According to Altman's credit scoring model:
- $Z > 2{,}67 \Rightarrow$ Low default risk class (green zone)
- $Z < 1.81 \Rightarrow$ High default risk class (red zone)
- $1{,}81 < Z < 2{,}67 \Rightarrow$ uncertain risk class (grey zone)
- Ex: Suppose that the financial ratios for a potential borrowers:
- $X_1 = .20$ $\qquad$ $X_2 = .0$
- $X_3 = -.20$ $\qquad$ $X_4 = .10$ $\qquad$ $X_5 = -2.0$
- Then $\qquad$ Z score = 1.64
- The FI should not make a loan to this borrower until it improves its earnings.

ALTMAN MODEL

✖ Discriminant models divide borrowers into high or low default risk classes contingent on their observed characteristics (Xj).

✖ The discriminant model by E.I. Altman:

✖ $Z = 1.2X_1 + 1.4 X_2 + 3.3 X_3 + 0.6 X_4 + 1.0 X_5$

✖ Where   Z = an overall measure of the default risk

✖ X_1 = Working Capital/Total Assets

✖ X_2 = Retained Earnings/Total Assets

✖ X_3 = Earnings before Interest & Taxes/Total Assets

✖ X_4 = Market Value of Equity/Book Value of Long-term Debt

✖ X_5 = Sales/Total Assets

CHAPTER III: TIME VALUE FOR MONEY AND CAPITAL BUDGETING

PLAN

- Section 1: Time value for money
- Section 2: capital budgeting

TIME LINES

$$0 \qquad\qquad 1 \qquad\qquad 2 \qquad\qquad 3$$

i%

$CF_0 \qquad\qquad CF_1 \qquad\qquad CF_2 \qquad\qquad CF_3$
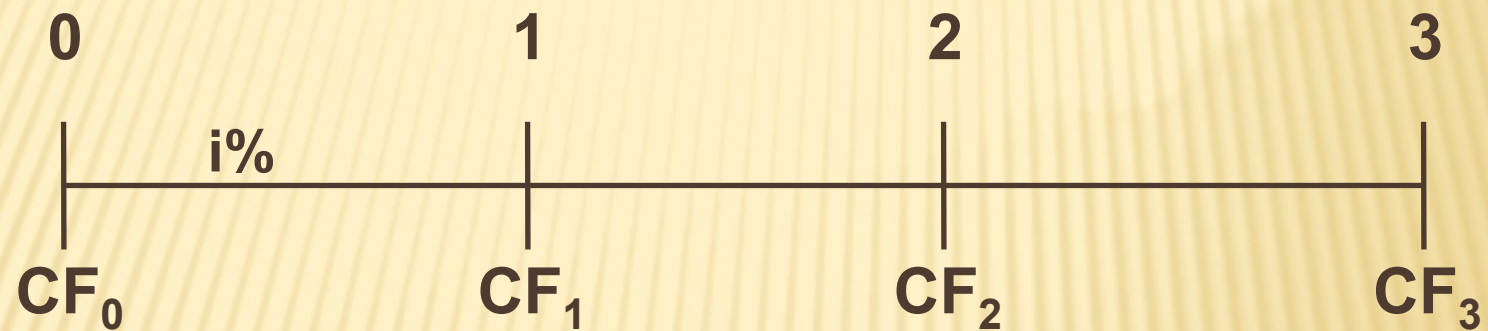
× Show the timing of cash flows.

× Tick marks occur at the end of periods, so Time 0 is today; Time 1 is the end of the first period (year, month, etc.) or the beginning of the second period.

WHAT IS THE FUTURE VALUE (FV) OF AN INITIAL $100 AFTER 3 YEARS, IF DISCOUNT RATE = 10%?

✖ Finding the FV of a cash flow or series of cash flows when compound interest is applied is called compounding.

0	1	2	3

10%

100   FV = ?
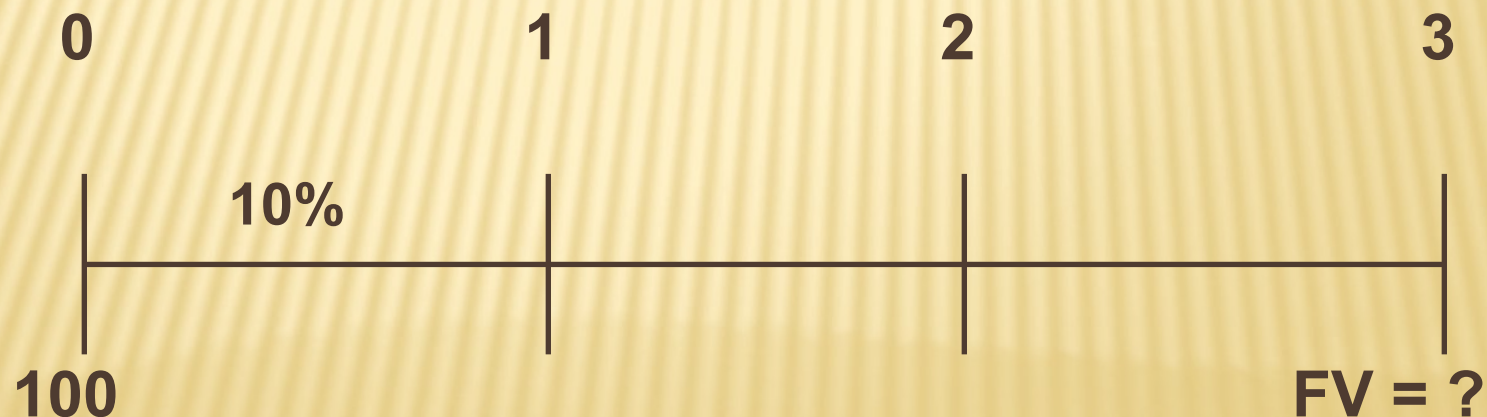
FUTURE VALUE

$$FV_n = PV (1 + i)^n$$

While:

n: investment period

i: discount rate

PV: value period 0 (sum invested at 0)

WHAT IS THE PRESENT VALUE (PV) OF $100 DUE IN 3 YEARS, IF DISCOUNT RATE = 10%?

- ✖ Finding the PV of a cash flow or series of cash flows when compound interest is applied is called discounting (the reverse of compounding).

- ✖ The PV shows the value of cash flows in terms of today's purchasing power.

```
0              1              2              3

    10%

PV = ?                                      100
```

PRESENT VALUE

$$PV = FV_n / (1 + i)^n$$

While:

n: investment period

i: discount rate

FV_n :value period n (future value)

EXAMPLE

Julie Miller wants to know how large of a deposit to make so that the money will grow to $10,000 in 5 years at a discount rate of 10%.

```
0          1          2          3          4          5

   10%

PV₀                                          $10,000
```

PV_0

$10,000
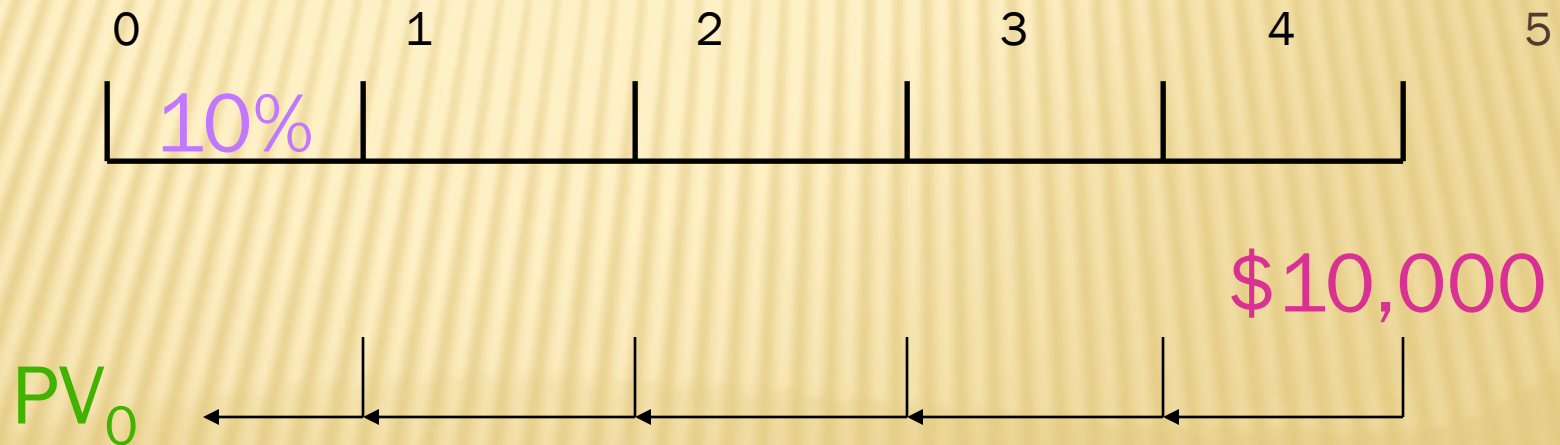
DISCOUNT RATE

✖ We want to estimate the discount rate that allows us to receive within n periods a FV, investing in period 0, PV.

- $$FV_n = PV (1 + i)^n$$

$$(FV_n/PV)^{(1/n)} -1 = i$$

LOAN AMORTIZATION

✖ Amortization tables are widely used for home mortgages, auto loans, business loans, retirement plans, etc.

✖ Spreadsheets are great for setting up amortization tables.

STEPS TO AMORTIZING A LOAN

1. Calculate the payment per period, using either:

   *calculation: payment = $(K * i)/(1-(1+i)^{(-n)})$

   with K; principal at the beginning (present value)

   *excel function: PMT =pmt(rate; maturity;present value)

2. Determine the interest paid in Period t=*(Loan Balance at t-1) x (i%)*

3. Compute principal payment in Period t. *(Payment - Interest from Step 2)*

4. Determine ending balance in Period t. *(Balance - principal payment from Step 3)*

5. Start again at Step 2 and repeat.

AMORTIZATION LOAN TABLE

End of the year	payment	interest	Principal	ending balance
0				K
1	a	K*i	a-K*i	K-a+K*i
2				
3				
4				

AMORTIZING A LOAN : EXAMPLE

Julie Miller is borrowing $20,000 at a compound annual interest rate of 11%. Amortize the loan if annual payments are made for 5 years.(constant payment each year)

SECTION 2 CAPITAL BUDGETING

OBJECTIVES

* Compute the net present value , the IRR and payback of an investment proposal.

* Explain the limitations of the IRR as an investment appraisal criterion.

* Propose alternative choice criteria

PROCEDURE TO VALUE INVESTMENT PROJECT

- 1. Forecast after-tax cash flows, assuming all-equity financing.

- 2. Assess the project's risk.

- 3. Estimate the opportunity cost of capital.

- 4. Calculate NPV, using the opportunity cost of capital as the discount rate.

NET CASH FLOW

* Income before taxes = revenues- expenses - depreciation

* Net income =Income before taxes –taxes

* Net cash flow = Net income +depreciation – capital expenditures -increase in NWC+salvage value

* Where salvage or terminal value represents the value of the investment at the end of the project

FREE CASH FLOW

=	EBIT	(1)
-	Interest	(2)
=	Profit before tax	
-	Taxes	(3)
=	Profit after tax	
+	Non-cash costs	(4)
-	Capital expenditures	
-	Increase in NWC	
+	Terminal Value	
±	Loan payments	(5)
=	Free Cash Flow^e	

Step 1: Estimate EBIT

Step 2: Less interest payments (calculated as a percent of long term debt).

Step 3: Less tax.

Step 4: Add back non-cash costs subtracted in step 1. Subtract capital expenditures and increases in net working capital. Add the terminal value accruing to equity holders in the final year.

Step 5: Add changes to loan principal (payments are negative and new loans are positive).

Step 6: Discount the FCF for each year

ESTIMATING CASH FLOWS EXAMPLE

* A new machine costs $60,000 with installation costs of $2,000.

It generates revenues of $155,000 and expenses of $100,000 annually. It is depreciated to its estimated salvage value of $6,000 over its seven year life. Tax rate represents 34%.

* What are the relevant cash flows?

NET PRESENT VALUE

- You have incremental cash flows:

$$CF_0, \; CF_1, \; CF_2, \; \dots \; , \; CF_T$$

NPV in year 0 is present values of all incremental cash flows:

$$NPV = CF_0 + \frac{CF_1}{(1+r)} + \frac{CF_2}{(1+r)^2} + \dots + \frac{CF_T}{(1+r)^T}$$

$$= \sum_{t=0}^{T} \frac{CF_t}{(1+r)^t}$$

where r is the WACC

NPV RULE SYNOPSIS

- Step 1: Determine the free cash flow of the investment

- Step 2: Estimate the discount rate

- Step 3: Compute the NPV of the investment, by discounting the free cash flow of the investment using the discount rate .

- NPV Rule: If NPV > 0, accept; if NPV < 0, reject

NPV AND CONCLUSION UNDER EXCEL

+npv(discount rate;CF1 to CFn) +CF0

+If (npv>0; »project accepted »; »project rejected »)

✖ Ex: compute the npv for the previous example and conclude using a discount rate of 15%

PROJECTS WITH DIFFERENT LIVES

✖ **Step 1:** Calculate the NPV for each project for one reinvestment cycle:

✖ **Step 2:** Convert the NPVs for each project into an **equivalent annual annuity**. Recall the annuity formula:

$$PV = a \times \frac{1-(1+i)^{-N}}{i} \Rightarrow a = PV \times \frac{i}{1-(1+i)^{-N}}$$

✖ +PMT(rate;n;npv)

✖ **Step 3:** choose the project with the highest annual annuity

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EXAMPLE

Your firm must decide which of two machines it should use to produce its output.
 Machine A costs $100,000, has a useful life of 4 years, and generates after-tax cash flows of $40,000 per year.
Machine B costs $65,000, has a useful life of 3 years, and generates after-tax cash flows of $35,000 per year.
The machine is needed indefinitely and the discount rate is r = 10%.

DISCOUNTED PAYBACK

✖ Payback Period:Length of time required to recover the initial investment of the project.

✖ If PB is less than project's life span , accept the project.

$$I = \sum^{PB} CF_p (1+a)^{-p}$$

EXAMPLE 1

- An initial investment of $2,324,000 is expected to generate $600,000 cash flow per year for 6 years. Calculate the discounted payback period of the investment if the discount rate is 11%.

- Step 1: Prepare a table to calculate discounted cash flow of each period by multiplying the actual cash flows by present value factor. Create a cumulative discounted cash flow column.

- Step 2: compute the pay back period

- Payback period = j+(cost investment –CFcum for j)/(Cfcum j+1-Cfcum j) where for j the Cfcum is less than the investment cost

EXAMPLE 2

✖ » Consider 3 projects; compute both pay back and NPV with 10% discount rate

Project	Cash Flows			
	t=0	t=1	t=2	t=3
A	-$2,000	$500	$500	$5,000
B	-$2,000	$500	$1,800	$0
C	-$2,000	$1,800	$500	$0

INTERNAL RATE OF RETURN

Rate of return to project required to obtain an NPV = 0.

- × If IRR > opportunity cost of capital (WACC) then accept project.

- × Example: Compute the IRR of the project 1 , 2 and 3 and conclude

PROBLEMS WITH IRR

Problem 1: Conflict between IRR and NPV (compute npv and IRR with 10% discount rate)

Year	0	1	2	3
Cash flow	1000	-3600	4320	-1728

Problem 2: Multiple IRR's (compute IRR)

Year	0	1	2	3	4	5	6
Cash flow	-1000	800	150	150	150	150	-150

PROBLEMS WITH IRR

Problem 3: No Real IRR (compute npv and IRR)

Year	0	1	2
Cash flow	1000	-3000	2500

Problem 4:Reinvestment rate assumptions: NPV approach is based on the assumption that cash flows can be reinvested at the project's risk-adjusted WACC, where the IRR approach is based on the assumption that cash flows can be reinvested at the IRR's project

MODIFIED IRR (MIRR)

- $I(1 + MIRR)^n = \Sigma\, CF_p\, (1+r)^{n-p}$

- ✖ Where r: reinvestment rate

- ✖ The MIRR is easy to calculate and doesn't suffer from IRR's limitations

EXAMPLE

Year	0	1	2	3	4
Cash flow	-1000	500	400	300	100

Compute for the following project:
(using a WACC of 10%)
1/ The IRR
2/ The MIRR

CHAPTER IV : COST OF CAPITAL

COST OF CAPITAL OBJECTIVES

❑ WACC is useful in a number of settings:

   ❑ WACC is used to value the firm.

   ❑ WACC is used as a starting point for determining the discount rate for investment projects the firm might undertake.

   ❑ WACC is the appropriate rate to use when evaluating performance, specifically whether or not the firm has created value for its shareholders.

THE WACC EQUATION

$$\text{Weighted Average Cost of Capital } (WACC) = \left[\left(\begin{array}{c} \text{After-tax Cost} \\ \text{of Debt } (k_d) \end{array} \right) \times \left(\begin{array}{c} \text{Proportion of} \\ \text{Capital Raised} \\ \text{by Debt } (w_d) \end{array} \right) \right]$$

$$+ \left[\left(\begin{array}{c} \text{Cost of Common} \\ \text{Stock } (k_{cs}) \end{array} \right) \times \left(\begin{array}{c} \text{Proportion of} \\ \text{Capital Raised} \\ \text{by Common Stock } (w_{cs}) \end{array} \right) \right]$$

$$WACC = (k_d \times (1 - T) \times w_d) + (k_{cs} \times w_{cs})$$

A THREE-STEP PROCEDURE FOR ESTIMATING FIRM WACC

1. Define the firm's capital structure by determining the weight of each source of capital.

2. Estimate the opportunity cost of each source of financing. We will use the current market value of each source of capital based on its current, not historical, costs.

3. Calculate a weighted average of the costs of each source of financing.

DETERMINING THE FIRM'S CAPITAL STRUCTURE WEIGHTS

❑ The weights are based on the following sources of capital: debt (short-term and long-term), preferred stock, and common equity.

❑ Liabilities such as accounts payable and accrued expenses are not included in capital structure.

❑ Ideally, the weights should be based on observed market values. However, not all market values may be readily available. Hence, we generally use book values for debt and market values for equity.

ESTIMATING THE COST OF INDIVIDUAL SOURCES OF CAPITAL

❑ The Cost of Debt

  ❑ **The cost of debt** is the rate of return the firm's lenders demand when they loan money to the firm.

  ❑ Note, the rate of return is not the same as coupon rate, which is the rate contractually set at the time of issue.

  ❑ We can estimate the market's required rate of return by examining the yield to maturity on the firm's debt.

  ❑ After-tax cost of debt = Yield (1-tax rate)

THE COST OF DEBT

Example What will be the yield to maturity on a debt that has par value of $1,000, a coupon interest rate of 5%, time to maturity of 10 years and is currently trading at $900? What will be the cost of debt if the tax rate is 30%?

THE COST OF DEBT

❑ It is not easy to find the market price of a specific bond as most bonds do not trade in the public market.

❑ Because of this, it is a standard practice to estimate the cost of debt using the average yield to maturity on a portfolio of bonds with similar *credit rating* and *maturity* as the firm's outstanding debt.

❑ The average yield to maturity for a specific rating class varies over time. It can also differ across different industry groups.

Figure 14.3

A Guide to Corporate Bond Ratings

Three firms are the primary sources of default ratings on corporate debt: Moody's, S&P, and Fitch.
Investment grade debt is rated Baa3 and BBB—or higher.

Moody's	S&P	Fitch	Definitions
Aaa	AAA	AAA	Prime. Maximum Safety
Aa1	AA+	AA+	High Grade High Quality
Aa2	AA	AA	
Aa3	AA−	AA−	
A1	A+	A+	Upper Medium Grade
A2	A	A	
A3	A−	A−	
Baa1	BBB+	BBB+	Lower Medium Grade
Baa2	BBB	BBB	
Baa3	BBB−	BBB−	
Ba1	BB+	BB+	Non-Investment Grade
Ba2	BB	BB	Speculative
Ba3	BB−	BB−	
B1	B+	B+	Highly Speculative
B2	B	B	
B3	B−	B−	
Caa1	CCC+	CCC	Substantial Risk
Caa2	CCC	—	In Poor Standing
Caa3	CCC−	—	
Ca	—	—	Extremely Speculative
C	—	—	May be in Default
—	—	DDD	Default
—	—	DD	
—	D	D	

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Figure 14.4

Corporate Bond Yields: Default Ratings and Term to Maturity

Yield to maturity for corporate bonds, arrayed by default rating and term to maturity. These data were compiled on March 1, 2006, and are typical. However, you would want to use the most recent data available when analyzing the cost of debt financing. Note that as the credit rating falls, the yield to maturity rises. Also, the yield to maturity typically increases for longer maturity bonds.

Rating	1 yr	2 yr	3yr	5 yr	7 yr	10 yr	30 yr
Aaa/AAA	4.88	4.87	4.95	5.03	5.16	5.27	5.46
Aa1/AA+	4.96	5.01	4.99	5.11	5.24	5.36	5.55
Aa2/AA	4.98	5.08	5.07	5.17	5.27	5.39	5.59
Aa3/AA−	4.99	5.1	5.08	5.21	5.31	5.4	5.65
A1/A+	5.17	5.19	5.2	5.28	5.39	5.52	5.73
A2/A	5.2	5.22	5.22	5.3	5.41	5.54	5.77
A3/A−	5.24	5.25	5.25	5.35	5.44	5.57	5.8
Baa1/BBB+	5.36	5.43	5.48	5.55	5.81	6	6.26 ←
Baa2/BBB	5.39	5.51	5.56	5.6	5.88	6.1	6.33
Baa3/BBB−	5.46	5.56	5.58	5.65	5.94	6.18	6.39
Ba1/BB+	6.59	6.66	6.73	6.78	6.95	7.14	7.31
Ba2/BB	6.69	6.76	6.83	6.88	7.05	7.24	7.41
Ba3/BB−	6.79	6.86	6.93	6.98	7.15	7.34	7.51
B1/B+	7.39	7.46	7.53	7.78	8.15	8.54	9.01
B2/B	7.49	7.56	7.63	7.88	8.25	8.64	9.11
B3/B−	7.59	7.66	7.73	7.98	8.35	8.74	9.21
Caa/CCC+	9.24	9.31	9.38	9.58	9.65	9.74	10.01
US Treasury Yield	4.74	4.71	4.68	4.63	4.6	4.59	4.56

Legend: These data are actually reported as "spread to Treasury yields," so for a 30-year Baa1/BBB+ corporate bond the yield would be reported as 170 basis points over the 30-year U.S. Treasury yield of 4.56%. A basis point is 1/100th of a percent. Therefore, 170 basis points is 1.7%, such that the corporate bond yield is 4.56% + 1.70% = 6.26%.

THE COST OF PREFERRED EQUITY

❑ The cost of preferred equity is the rate of return investors require of the firm when they purchase its preferred stock.

❑ The cost is not adjusted for taxes since dividends are paid to preferred stockholders out of after-tax income.

$$k_{ps} = \frac{D_{ps}}{P_{ps}}$$

❑ The cost of preferred stock can be inferred from its trading price and the fixed dividend:

THE COST OF PREFERRED EQUITY

Example   Consider the preferred shares of Relay Company that are trading at $25 per share. What will be the cost of preferred equity if these stocks have a par value of $35 and pay annual dividend of 4%?

THE COST OF COMMON EQUITY

❑ The **cost of common equity** is the rate of return investors expect to receive from investing in firm's stock.

❑ This return comes in the form of cash distributions of dividends and cash proceeds from the sale of the stock.

❑ Cost of common equity is harder to estimate since common stockholders do not have a contractually defined return similar to the interest on bonds or dividends on preferred stock. There are two approaches to estimating the cost of common equity:

  ❑ Dividend growth model
  ❑ Dividend constant model

THE DIVIDEND GROWTH MODEL – DISCOUNTED CASH FLOW APPROACH

❑ Using this approach, we estimate the expected stream of dividends as the source of future estimated cash flows.

❑ We use the estimated dividends and current stock price to calculate the internal rate of return on the stock investment. This return is used as an estimate of cost of equity.

❑ Originally, we use the dividend growth model to estimate the stock value. Now we take the market price of the stock as the fair value, and learn what the discount rate (required rate of return) should be if the market price is the fair value.

THE CONSTANT GROWTH CASE

❑ If we assume that the dividend grows at a constant rate, g, the stock can be valued as

$$V_{cs} = \frac{D_1}{k_{cs} - g}$$

where k_{cs} is the cost of common equity or required rate of return on the equity and V_{cs} is the fair value.

❑ If we set the market price to the fair value, $P_{cs} = V_{cs}$, we can infer the cost of common equity as,

$$k_{cs} = \frac{D_1}{P_{cs}} + g$$

D/P is called the dividend yield (DY).

ESTIMATING THE RATE OF GROWTH, G

❑ The growth rate can be obtained from various websites that post analysts forecasts of growth rates.

❑ We can also estimate the growth rate using the historical data and computing the arithmetic average or geometric average.

ESTIMATING THE RATE OF GROWTH, G

Year	Dividend
2004	$0.800
2005	0.825
2006	0.840
2007	0.875
2008	0.900

Compute the arithmetic and geometric average of dividend growth rate