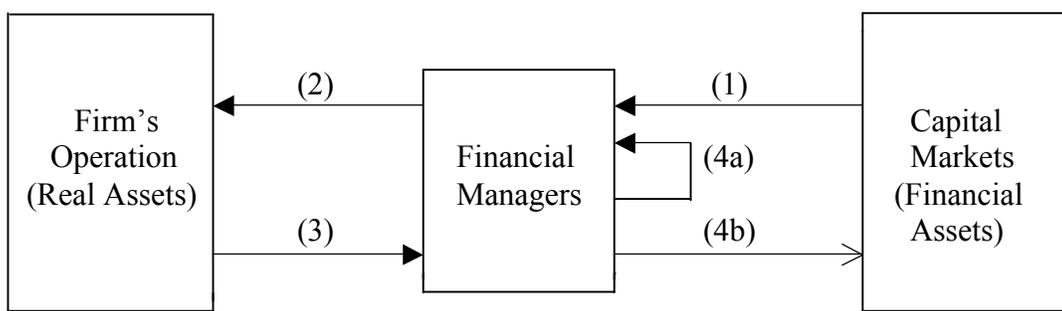


Chapter 1 -- An Overview of Financial Management

- What is finance: cash flows between capital markets and firm's operations
 - The goal of a firm
 - Forms of business organization
 - Intrinsic value and market price of a stock
 - Agency problem
 - Business ethics
 - Career opportunities in finance
-
- What is finance: cash flows between capital markets and firm's operations



- (1) Cash raised by selling financial assets in financial markets
- (2) Cash invested in firm's operations and used to purchase real assets
- (3) Cash generated from firm's operations
- (4a) Cash reinvested in firms' operations
- (4b) Cash returned to investors

Financing decisions vs. investment decisions: raising money vs. allocating money

Activity (1) is a financing decision

Activity (2) is an investment decision

Activities (4a) and (4b) are financing decisions

The role of a financial manager

Forecasting and planning of firms' financial needs

Making financing and investment decisions

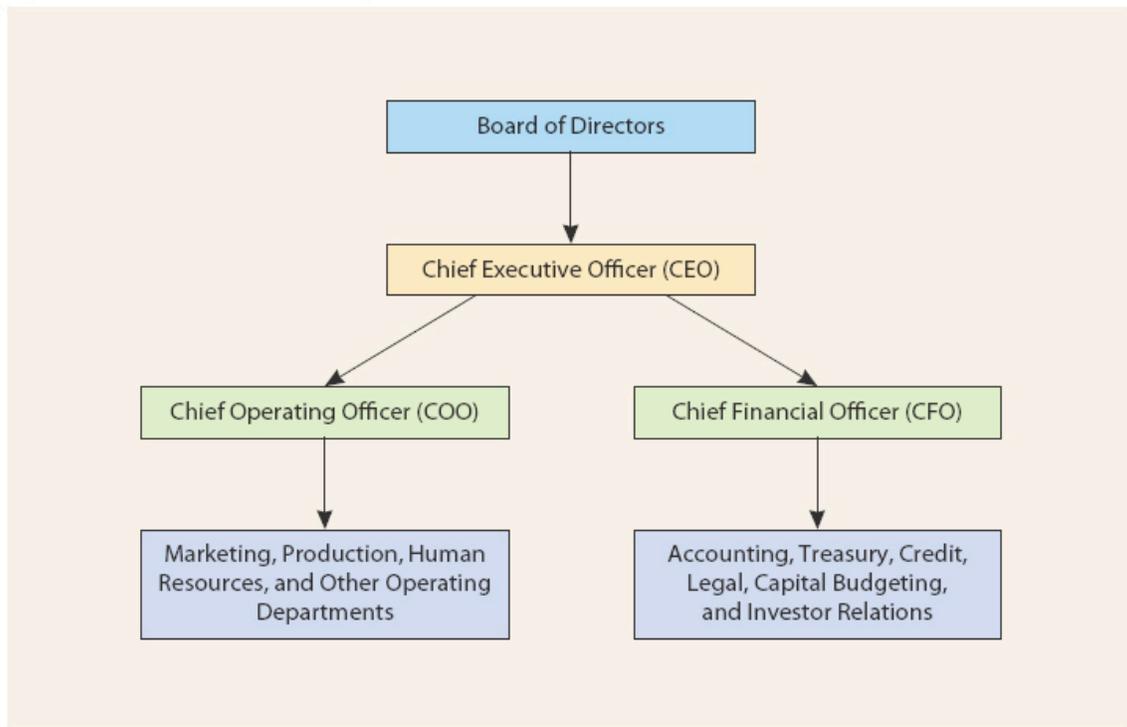
Coordinating with other departments/divisions

Dealing with financial markets

Managing risks

FIGURE 1-1

Finance within an Organization



Finance includes three areas

(1) Financial management: corporate finance, which deals with decisions related to how many and what types of assets a firm needs to acquire (investment decisions), how a firm should raise capital to purchase assets (financing decisions), and how a firm should do to maximize its shareholders wealth (goal of a firm) - the focus of this class

(2) Capital markets: study of financial markets and institutions, which deals with interest rates, stocks, bonds, government securities, and other marketable securities. It also covers Federal Reserve System and its policies.

(3) Investments: study of security analysis, portfolio theory, market analysis, and behavioral finance

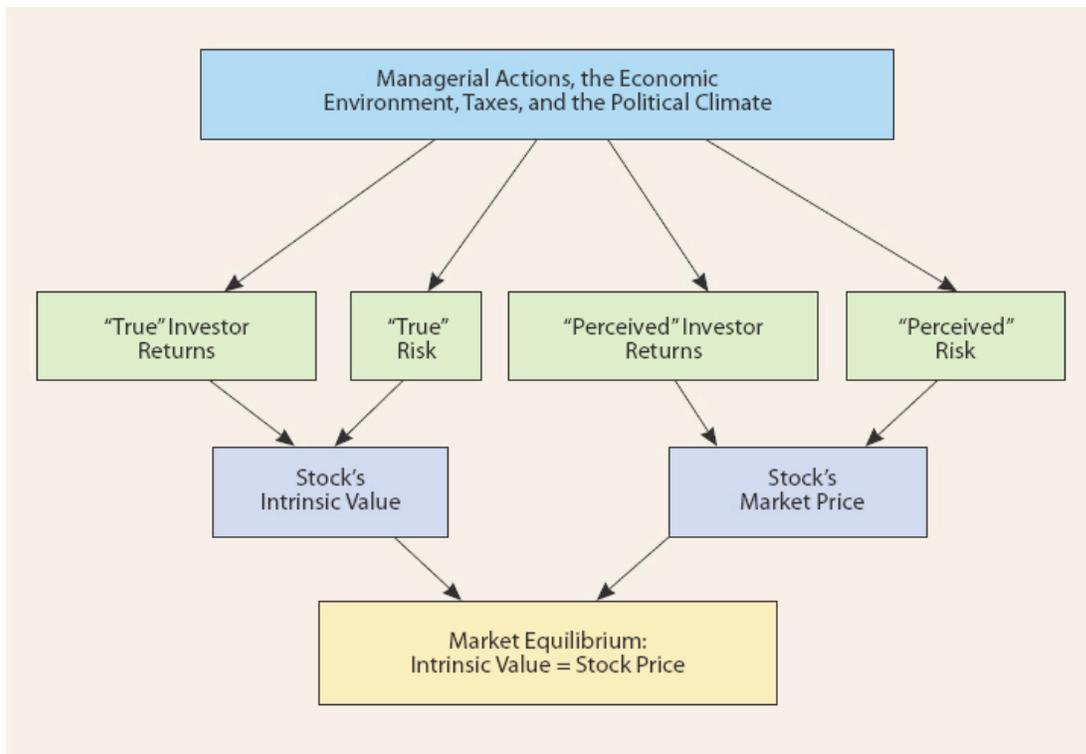
- The goal of a firm
 - To maximize shareholder's wealth (or firm's long-run value)
 - Why not profit or EPS maximization?
 - Profit maximization usually ignores timing and risk of cash flows
 - EPS sometimes can be manipulated or misleading

Why not focusing on short-term?

Top executives receive huge bonuses for engaging in risky transactions that could generate short-term profits and those transactions collapse later on, subprime mortgage, for example
- Forms of business organization
 - Proprietorship: an unincorporated business owned by one individual
 - Advantages:
 - Easy and inexpensive to form
 - Subject to less government regulations
 - Lower income taxes
 - Disadvantages:
 - Unlimited personal liability
 - Limited lifetime of business
 - Difficult to raise capital
 - Partnership: an unincorporated business owned by two or more people
 - Advantages vs. disadvantages: similar to those of proprietorship, in general
 - Corporation: legal entity created by a state
 - Advantages:
 - Limited liability
 - Easy to transfer the ownership
 - Unlimited lifetime of business
 - Easy to raise capital
 - Disadvantages:
 - Double taxation (at both corporate and individual levels)
 - Cost of reporting
- Intrinsic value and market price of a stock
 - Intrinsic value is an estimate of a stock's "fair" value (how much a stock should be worth)
 - Market price is the actual price of a stock, which is determined by the demand and supply of the stock in the market
 - Determinants of intrinsic value and stock price

FIGURE 1-2

Determinants of Intrinsic Values and Stock Prices



Intrinsic value is supposed to be estimated using the “true” or accurate risk and return data. However, since sometimes the “true” or accurate data is not directly observable, the intrinsic value cannot be measured precisely.

Market value is based on perceived risk and return data. Since the perceived risk and return may not be equal to the “true” risk and return, the market value can be mispriced as well.

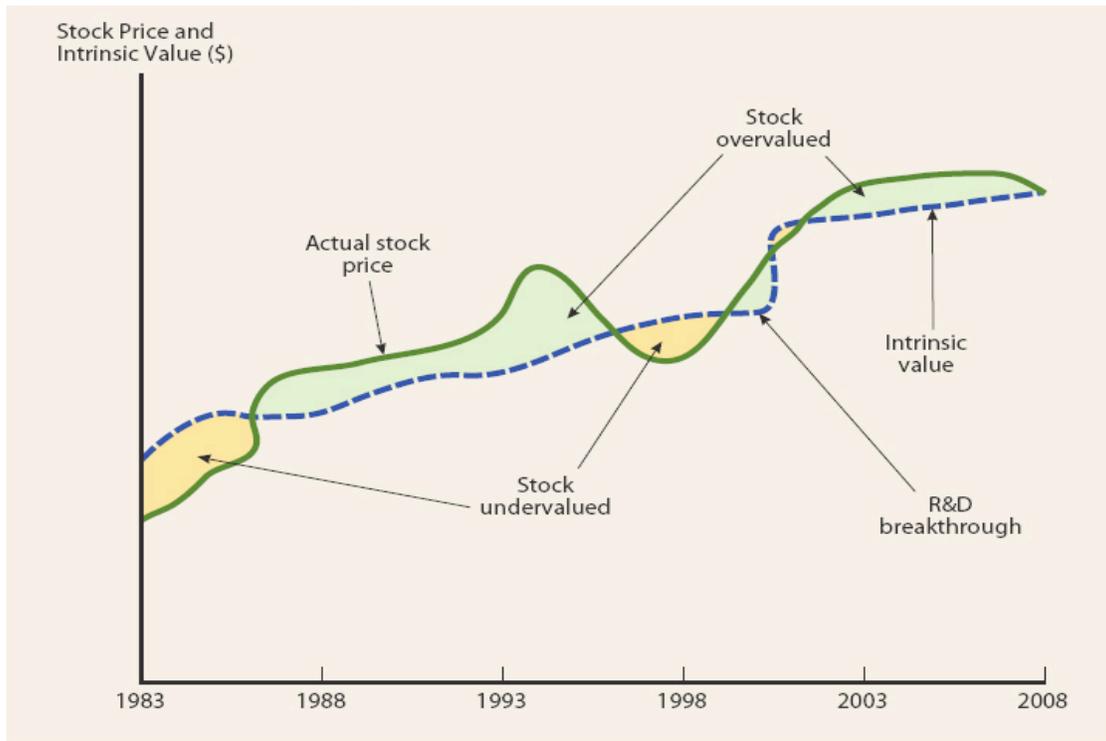
Stock in equilibrium: when a stock’s market price is equal to its intrinsic value the stock is in equilibrium

Stock market in equilibrium: when all the stocks in the market are in equilibrium (i.e. for each stock in the market, the market price is equal to its intrinsic value) then the market is in equilibrium

Actual prices vs. intrinsic values

FIGURE 1-3

Graph of Actual Prices versus Intrinsic Values



When the intrinsic value of a stock is higher than the market price of the stock, we say that the stock in the market is under-valued (under-priced)
For example, if the intrinsic value for a stock is \$26 and the market price is \$25, then the stock is under-valued.

When the intrinsic value of a stock is lower than the market price of the stock, we say that the stock in the market is over-valued (over-priced)
For example, if the intrinsic value for a stock is \$30 and the market price is \$32, then the stock is over-valued.

When the intrinsic value of a stock is equal to the market price of the stock, we say that the stock in the market is fairly priced (the stock is in equilibrium)

- Agency problem
A potential conflict of interest between two groups of people

Stockholders vs. managers

Instead of shareholders' wealth maximization, managers may be interested in their own wealth maximization

Useful motivational tools

Performance shares, executive stock options (positive)
Threat of firing (negative)
Hostile takeover (negative)

Stockholders vs. bondholders
Stockholders prefer high-risk projects for higher returns
Bondholders receive fixed payment and therefore prefer lower risk projects

- **Business ethics**
Standards of conduct or moral behavior toward its employees, customers, community, and stockholders - all its stakeholders

Measurements: tendency of its employees, adhere to laws and regulations, moral standards to product safety and quality, fair employment practice, fair marketing and selling practice, proper use of confidential information, community involvement, and no illegal payments or practice to obtain business
- **Career opportunities in finance**
Banking
Investments
Insurance
Corporations
Government
- **Exercise**
ST-1
Questions: 1-8

Chapter 2 -- Financial Markets and Institutions

- Capital allocation process
- Financial markets
- Financial institutions
- The stock market and stock returns
- Stock market efficiency

- Capital allocation process

The process of capital flows from those with surplus capital to those who need it

Three types of transfer

(1) Direct transfer: a business sells its security directly to investors

(2) Indirect transfer through an investment banker: a business sells its security to an investment banker, which in turn sells the same security to individual investors

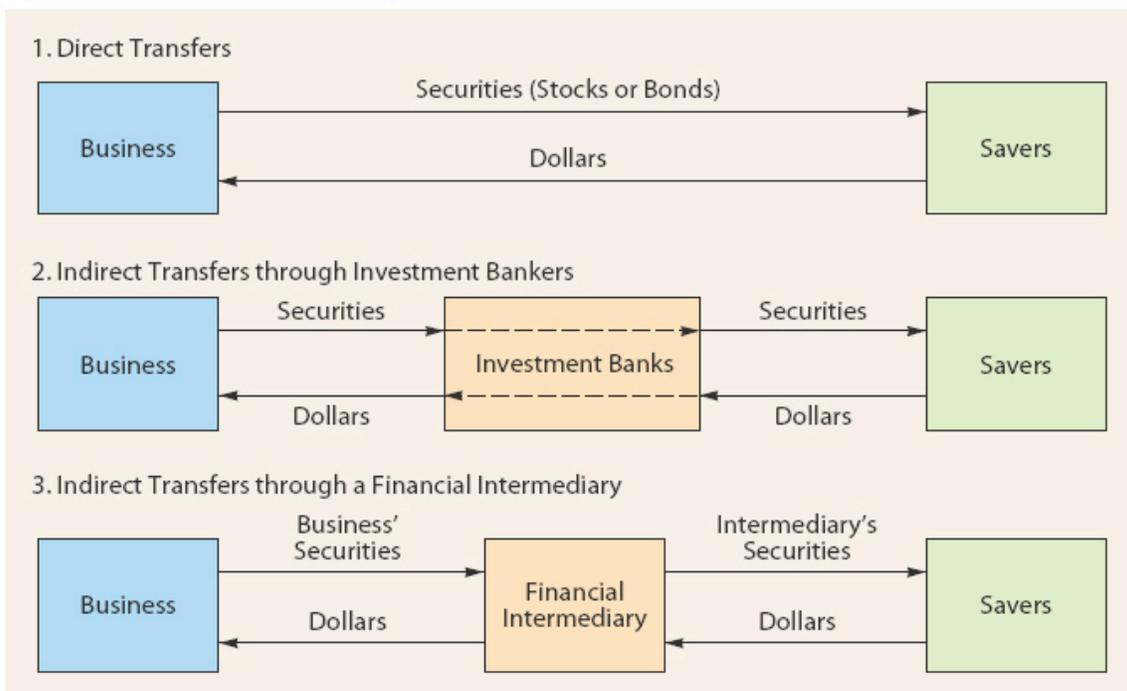
(3) Indirect transfer through a financial intermediary: a financial intermediary obtains funds from investors by offering its own securities and uses funds to buy other business securities

Capital formation process



FIGURE 2-1

Diagram of the Capital Formation Process



- Financial markets
 - Physical asset market vs. financial asset markets
 - Physical asset markets are markets for real (or tangible) assets
 - Financial asset markets are markets for financial assets - focus of this class
 - Money markets vs. capital markets
 - Money markets are markets for short-term and highly liquid debt securities (less than one year)
 - Capital markets are markets for intermediate and long-term debts and stocks (one year or longer)
 - Primary markets vs. secondary markets
 - Primary markets are markets for issuing new securities
 - Secondary markets are markets for trading existing securities
 - Spot markets vs. futures markets
 - Spot markets are markets for immediate delivery
 - Futures markets are markets for future delivery even though the deal is made today
 - Private markets vs. public markets
 - In private markets: transactions are negotiated directly between two parties
 - Public markets: standardized contracts are traded on organized exchanges
 - Derivative markets: for derivative securities
 - A derivative security is a security whose value is derived from the value of an underlying asset. For example, futures contracts and option contracts
 - Why do we need financial markets?
 - Bring borrowers and lenders together to exchange needs
- Financial institutions
 - Investment banks (investment banking houses): specialized in underwriting and distributing new securities, such as Merrill Lynch (acquired by BOA)
 - The role of investment bankers: underwriters
 - Design securities with features that are attractive to investors
 - Buy these securities from the issuing firm
 - Resell these securities to individual investors
 - Public offering vs. private placement
 - Public offering: a security offering to all investors
 - Private placement: a security offering to a small number of potential investors

Commercial banks: provide basic banking and checking services, such as BOA

Financial service corporations: large conglomerates that combine different financial institutions into a single corporation, such as Citigroup

S&Ls, credit unions

Life insurance companies

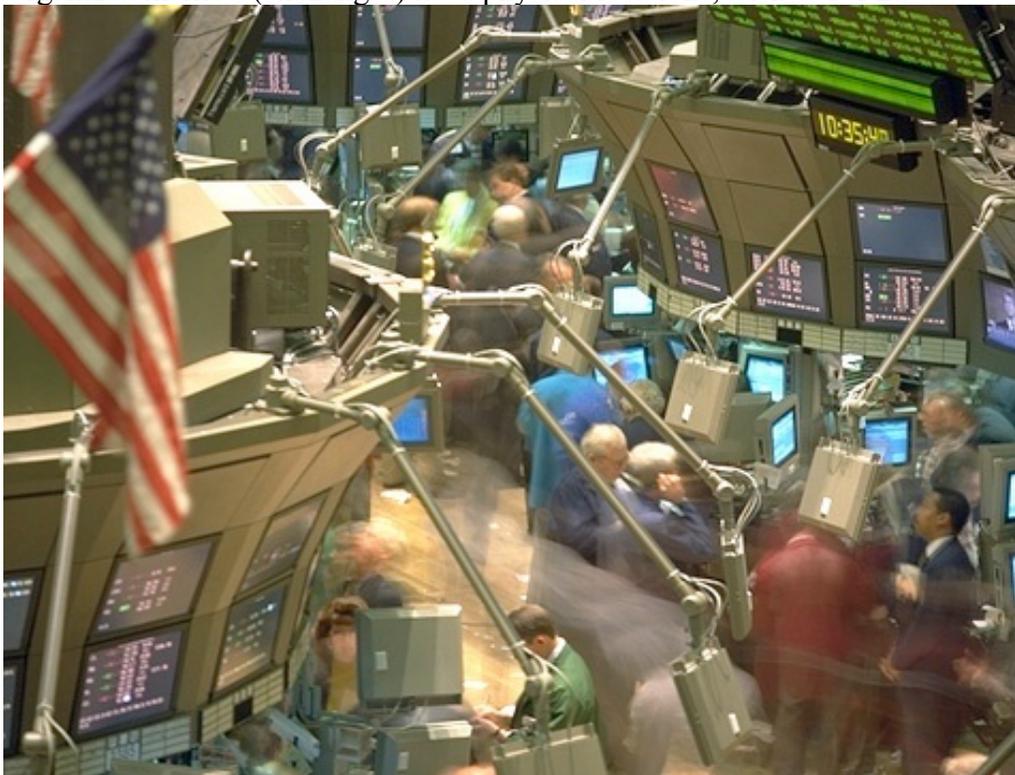
Mutual funds: sell themselves to investors and use funds to invest in securities

Exchange traded funds (ETFs): mutual funds but traded like stocks

Hedge funds: similar to mutual funds with few restrictions

- The stock market and stock returns
Organized markets vs. over-the-counter (OTC) markets

Organized markets (exchanges) have physical locations, such as NYSE



OTC markets are connected by computer network with many dealers and brokers, such as NASDAQ

Auction markets vs. dealer markets
 Organized markets are auction markets
 OTC markets are dealer markets

IPO markets: markets for initial public offerings

Stock market transactions (three types)

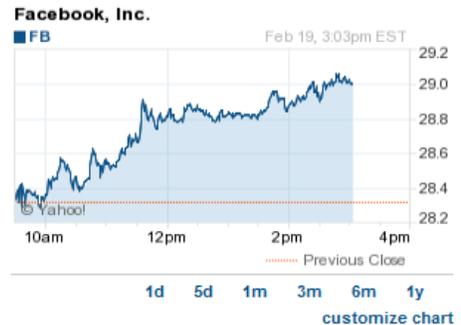
- (1) Trading outstanding (existing) shares takes place in a secondary market
- (2) Selling additional shares by a publicly owned firm takes place in a primary market (seasoned offerings)
- (3) Selling shares to the public for the first time by a privately owned firm takes place in a primary market (IPOs)

Stock market reporting

Facebook, Inc. (FB) - NasdaqGS

29.03 +0.71(2.51%) 3:03PM EST - Nasdaq Real Time Price

Prev Close:	28.32	Day's Range:	28.12 - 29.08
Open:	28.19	52wk Range:	17.55 - 45.00
Bid:	29.03 x 4000	Volume:	33,729,430
Ask:	29.04 x 4500	Avg Vol (3m):	68,521,900
1y Target Est:	33.59	Market Cap:	69.17B
Beta:	1.702	P/E (ttm):	1,935.93
Next Earnings Date:	N/A	EPS (ttm):	0.02
		Div & Yield:	N/A (N/A)



Stock Symbol (FB)

Prev close: closing price yesterday was \$28.32

Change: change from the last trading price and the yesterday' closing price is \$0.71 = \$29.03 - \$28.32 (0.71/28.32 = 2.51%)

Bid: someone wants to buy 4,000 shares at 29.03

Ask: someone is offering to sell 4,500 shares at 29.04

1 year target: the median 1-year target price forecasted by analysts

Beta: market risk for Facebook (will be discussed later)

Day's Range: range of the highest and lowest prices for the day (\$28.12 - \$29.08)

52 wk Range: range of the highest and lowest prices in the past 52 weeks (\$17.55 - \$45)

Volume: trading volume up to 3:03 PM ET is 33,729,430 shares

Avg Vol (3m): average daily trading volume over the past 3 months is 68,521,900 shares

Market Cap: the total value of Facebook stock (\$69.17 billion)

P/E (ttm): price to earnings (in the past 12 months) ratio is 1,935.93 (extremely high)

EPS: earnings per share (\$0.02, extremely low)

Div & Yield: annual dividend and dividend yield (N/A)

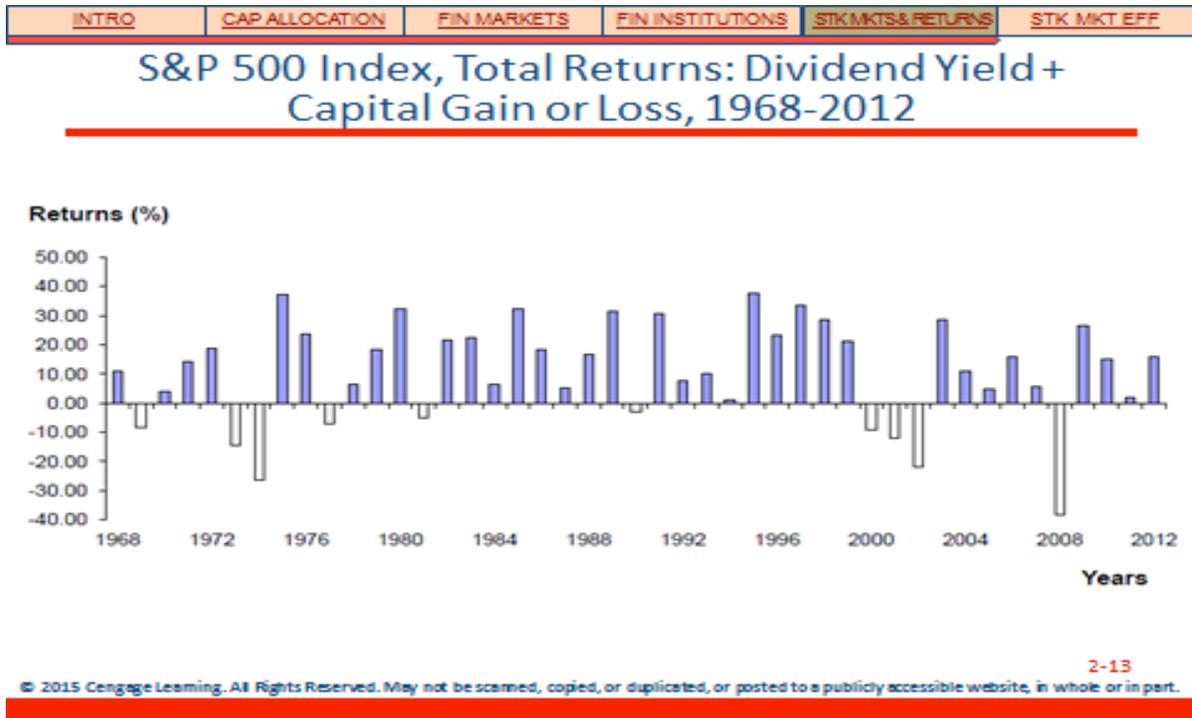
Stock market returns

Expected return: return expected to be realized, which is always positive

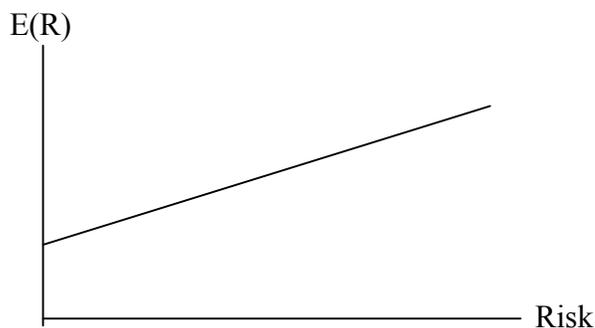
Realized return: actual return received, which can be either positive or negative

Measuring the stock market: DJIA, S&P 500 index, NASDAQ composite index

Realized S&P 500 total returns, 1968 - 2012



There is a positive relation between expected return and risk



Stock market efficiency

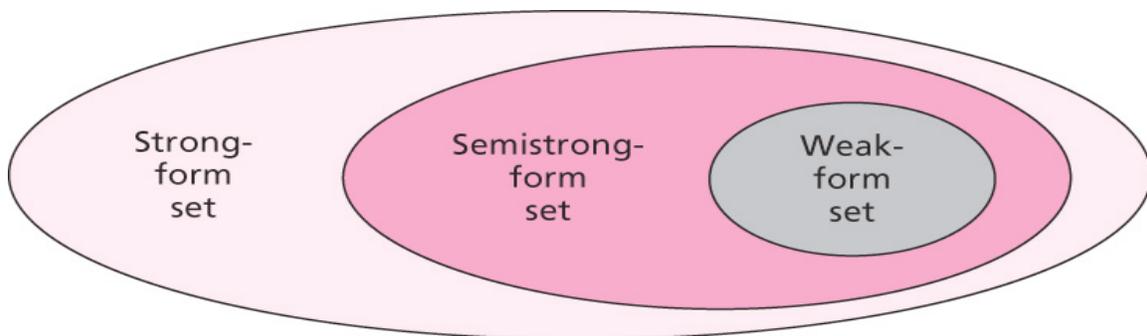
Efficient market: prices of securities in the market should fully and quickly reflect all available information, which means that market prices should be close to intrinsic values (market in equilibrium)

Levels of market efficiency

Weak-form efficiency - stock prices already reflect all information contained in the history of past price movements (only past prices, volumes, and returns)

Semistrong-form efficiency - stock prices already reflect all publicly available information in the market (only past publicly available information)

Strong-form efficiency - stock prices already reflect all available information in the market, including inside information (all public and private information)



Where is the market today?

Less efficient

Small firms with less coverage and contact

More efficient

Large firms with more coverage and contact

- **Exercise**

ST-1

Questions: 2, 3, 4, and 7

Example: investors expect a company to announce a 10% increase in earnings; instead, the company announces a 3% increase. If the market is semi-strong form efficient, which of the following would you expect to happen? (b)

- a. The stock's price will increase slightly because the company had a slight increase in earnings.
- b. The stock's price will fall because the increase in earnings was less than expected.
- c. The stock's price will stay the same because earnings announcements have no effect if the market is semi-strong form efficient.

Chapter 3 -- Financial Statements, Cash Flow, and Taxes

- Financial statements and reports
- Basic financial statements
- Free cash flow
- MVA and EVA
- Income taxes

- Financial statements and reports

Annual report

A report issued annually to shareholders that contains:

(1) Verbal statements: explain what happened and why; offer future prospects

(2) Financial statements:

Balance sheet

Income statement

Cash flow statement

Shareholder's equity statement

Importance of financial statements and reports

To investors: provide valuable information regarding the firm

To managers: for internal control and financial planning

- Basic financial statements

(1) Balance sheet: a statement of a firms' financial position at a point in time

Cash & marketable securities

Accounts receivable (A/R)

Inventory

Current assets

+

Net fixed assets

+

Other assets

Total assets

=

Accounts payable (A/P)

Accrued wages and taxes (Accruals)

Notes payable

Current liabilities

+

Long-term debt

+

Shareholders' equity (c/s and R/E)

Total liabilities and equity

} Total liabilities

Note: $\text{Current liabilities} + \text{long-term debt} = \text{total liabilities}$
 $\text{Shareholder's equity (Common equity)} = \text{total assets} - \text{total liabilities}$
 $\text{Shareholders' equity} = \text{common stock (c/s)} + \text{retained earnings (R/E)}$
 $= \text{paid-in capital} + \text{retained earnings}$
 $\text{Paid-in capital} = \text{market value of stock} - \text{par value of stock}$
 Retained earnings are cumulative, assuming no preferred stocks

Working capital: refers to current assets

Net working capital = current assets - current liabilities

Net operating working capital = current assets - (current liabilities - notes payable)

Market value vs. book value

Market value = the actual market price

Book value = (common equity) / (# of shares outstanding)

Table 3.1: Allied Food Product Balance Sheets

(2) Income statement: a report summarizing a firm's revenues, expenses, and profits during a reporting period

Sales
- Operating cost except depreciation and amortization

EBITDA
- Depreciation and amortization

Earnings before interest and taxes (EBIT)
- Interest expenses

Earnings before Tax (EBT)
- Income tax

Net income (NI)

NI can be used for cash dividend and/or retained earnings

Commonly used terms:

Earnings per share (EPS) = NI / number of shares outstanding

Dividend per share (DPS) = cash dividend / number of shares outstanding

Dividend payout ratio = cash dividend / NI

Retention ratio = retained earnings / NI

Table 3.2: Allied Food Products Income Statements

(3) Cash flow statement: a report showing how things affect the balance sheet and income statement will affect the firm's cash flows

Cash flow statement has four sections: operating, long-term investing, financing activities, and summary on cash flows over an accounting period

Table 3.3: Allied Food Products Cash Flow Statements

(4) Shareholder's equity statement

Last year's end balance

Add this year's R/E = NI - Common stock cash dividend

This year's end balance

Table 3.4: Allied Food Products Statement of Stockholders' Equity

- Free cash flow

Accounting profit vs. cash flow

Accounting profit is a firm's net income reported on its income statement.

Net cash flow is the actual net cash that a firm generates during a specified period.

Net cash flow = NI + depreciation and amortization

Free cash flow: a amount of cash available for payments to all investors, including stockholders and debt-holders after investments to sustain ongoing operations

FCF = EBIT*(1-T) + depreciation and amortization - (capital expenditures + Δ in net operating working capital)

- MVA and EVA

MVA stands for market value added, which is the excess of the market value of equity over its book value - focus

EVA stands for economic value added, which is the excess of net operating profit after tax (NOPAT) over capital costs

NOPAT = EBIT*(1-T)

Capital costs = total investor-supplied operating capital*after-tax cost of capital

Problem 3-5: MVA calculation

\$500 million of common equity, stock price is \$60 per share, market value added is \$130 million. How many shares are outstanding?

Answer: $(500 + 130)/60 = 10.5$ million shares

Problem 3-6: MVA calculation

Shareholders' equity = \$35,000,000, number of shares outstanding = 2,000,000
stock price = \$30 per share, what is MVA?

Answer: market value of stock = $30 * 2,000,000 = \$60,000,000$

MVA = $60,000,000 - 35,000,000 = \$25,000,000$

- Income taxes

Progressive tax rate system: the tax rate is higher on higher income

Taxable income: gross income minus exceptions and allowable deductions as set forth in the Tax Code or the income that is subject to taxes

Marginal tax rate: the tax rate applicable to the last dollar made

Average tax rate: taxes paid divided by total taxable income

Personal income tax:

Interest income: taxed as ordinary income (up to 39.6% for federal taxes + additional state taxes)

Dividend income: used to be taxed as ordinary income (currently is taxed at 15% for most investors and the maximum 20% for wealthy investors)

Capital gains (short-term, less than a year): taxed as ordinary income

Capital gains (long-term, more than a year): taxed at 15% for most investors and the maximum of 20% for wealthy investors

Capital losses are tax deductible up to \$3,000 or to offset capital gains

Alternative Minimum TAX (AMT): created by Congress to make it more difficult for wealthy individuals to avoid taxes through the use of various deductions

Equivalent pre-tax yield vs. after tax return

Equivalent pre-tax yield = tax-free return / (1 - T)

After tax return = before tax return (1 - T)

Example: suppose your marginal tax rate is 28%. Would you prefer to earn a 6% taxable return or 4% tax-free return? What is the equivalent taxable yield of the 4% tax-free yield?

Answer: $6% * (1 - 28%) = 4.32%$ or $4% / (1 - 28%) = 5.56%$

You should prefer 6% taxable return because you get a higher return after tax, ignoring the risk

Corporate income tax:

Interest income is taxed as ordinary income

Interest expenses are tax deductible

Dividend income is 70% tax-exempt (70% dividend exclusion)

Dividend paid is not tax deductible

Capital gains are taxed as ordinary income

Capital losses can only offset capital gains (carry back for 3 years or carry forward for 5 years)

Operating losses can offset taxable income (carry back for 2 years or carry forward for 20 years)

Depreciation: plays an important role in income tax calculation - the larger the depreciation, the lower the taxable income, the lower the tax bill

Depreciation methods:

Straight-line method depreciates cost evenly throughout the useful life of the fixed asset

Double-declining balance method is an accelerated depreciation method that counts twice as much of the asset's book value each year as an expense compared to straight-line depreciation.

Modified accelerated cost recovery system (MACRS) is the current tax depreciation system in the United States. Under this system, the capitalized cost (basis) of tangible property is recovered over a specified life by annual deductions for depreciation. The lives are specified broadly in the Internal Revenue Code. The Internal Revenue Service (IRS) publishes detailed tables of lives by classes of assets.

Example:	Corporate tax calculation	
	Sales	\$4,500,000
	OC excluding depreciation	(3,000,000)
	Depreciation	<u>(1,000,000)</u>
	Operating income	\$ 500,000
	Interest income	10,000
	Dividend income \$10,000	3,000 (because 70% exclusion)
	Interest payment	(200,000)
	Capital gains	<u>20,000</u>
	Total taxable income	\$ 333,000

Table 3-6**Corporate Tax Rates as of January 2008**

If a Corporation's Taxable Income Is	It Pays This Amount on the Base of the Bracket	Plus This Percentage on the Excess over the Base (Marginal Rate)	Average Tax Rate at Top of Bracket
Up to \$50,000	\$ 0	15%	15.0%
\$50,000–\$75,000	7,500	25	18.3
\$75,000–\$100,000	13,750	34	22.3
\$100,000–\$335,000	22,250	39	34.0
\$335,000–\$10,000,000	113,900	34	34.0
\$10,000,000–\$15,000,000	3,400,000	35	34.3
\$15,000,000–\$18,333,333	5,150,000	38	35.0
Over \$18,333,333	6,416,667	35	35.0

¹⁶ On December 26, 2007, President Bush signed legislation that (1) increases the AMT exemption amounts for 2007 to \$44,350 for single taxpayers and \$66,250 for joint filers and (2) allows taxpayers to take several tax credits for AMT purposes through 2007.

$$\text{Total tax} = 22,250 + (333,000 - 100,000) * (0.39) = \$113,120$$

$$\text{Marginal tax rate} = 39\%; \text{Average tax rate} = (113,120 / 333,000) = 33.97\%$$

- **Exercise**

ST-1 and ST-2

Problems: 1, 2, 3, 4, 8, and 9

Chapter 4 -- Financial Statement Analysis

- Financial ratio analysis
- Du Pont equations
- Trend analysis
- Limitations in ratio analysis
- Looking beyond the numbers

- Financial ratio analysis

Evaluating a firm's financial statement to predict the firm's future performance

(1) Liquidity ratios: show a firm's ability to pay off short-term debt (the relationship of a firm's cash and other current assets to its current liabilities)

Current ratio = current assets / current liabilities

Quick ratio (acid test ratio) = (current assets - inventory) / current liabilities

Questions:

Is it always good to have a very high current or quick ratio?

What would happen if they were very low?

Why would you like to keep current and quick ratios close to industry averages?

(2) Asset management ratios: measure how effectively a firm manages its assets

Inventory turnover = sales / inventory

Days Sales Outstanding (DSO) = account receivables / average daily sales

Fixed asset turnover = sales / net fixed assets

Total asset turnover = sales / total assets

Firms want to increase turnover ratios and keep DSO as low as possible

(3) Debt management ratios: show how the firm has financed its assets as well as the firm's ability to pay off its long-term debt (how effectively a firm manages its debt)

Using debt has tax benefit (interests on debt are tax deductible). On the other hand, too much debt increases the firm's risk of being bankrupt.

Effect of Financial Leverage (effect of using debt)

Table 4-1

Effects of Financial Leverage on Stockholder Returns

FIRM U [UNLEVERAGED (NO DEBT)]			
Current assets	\$ 50	Debt	\$ 0
Fixed assets	<u>50</u>	Common equity	<u>100</u>
Total assets	<u>\$100</u>	Total liabilities and equity	<u>\$100</u>

	STATE OF THE ECONOMY		
	Good	Expected	Bad
Sales revenues	\$150.0	\$100.0	\$75.0
Operating costs Fixed	45.0	45.0	45.0
Variable	<u>60.0</u>	<u>40.0</u>	<u>30.0</u>
Total operating costs	<u>105.0</u>	<u>85.0</u>	<u>75.0</u>
Operating income (EBIT)	\$ 45.0	\$ 15.0	\$ 0.0
Interest (Rate = 10%)	<u>0.0</u>	<u>0.0</u>	<u>0.0</u>
Earnings before taxes (EBT)	\$ 45.0	\$ 15.0	\$ 0.0
Taxes (Rate = 40%)	<u>18.0</u>	<u>6.0</u>	<u>0.0</u>
Net income (NI)	<u>\$ 27.0</u>	<u>\$ 9.0</u>	<u>\$ 0.0</u>
ROE _U	27.0%	9.0%	0.0%

FIRM L [LEVERAGED (SOME DEBT)]			
Current assets	\$ 50	Debt	\$ 50
Fixed assets	<u>50</u>	Common equity	<u>50</u>
Total assets	<u>\$100</u>	Total liabilities and equity	<u>\$100</u>

	STATE OF THE ECONOMY		
	Good	Expected	Bad
Sales revenues	\$150.0	\$100.0	\$75.0
Operating costs Fixed	45.0	45.0	45.0
Variable	<u>60.0</u>	<u>40.0</u>	<u>30.0</u>
Total operating costs	<u>105.0</u>	<u>85.0</u>	<u>75.0</u>
Operating income (EBIT)	\$ 45.0	\$ 15.0	\$ 0.0
Interest (Rate = 10%)	<u>5.0</u>	<u>5.0</u>	<u>5.0</u>
Earnings before taxes (EBT)	\$ 40.0	\$ 10.0	-\$ 5.0
Taxes (Rate = 40%)	<u>16.0</u>	<u>4.0</u>	<u>0.0</u>
Net income (NI)	<u>\$ 24.0</u>	<u>\$ 6.0</u>	<u>-\$ 5.0</u>
ROE _L	48.0%	12.0%	-10.0%

Debt ratio = total debt / total assets

Times interest earned (TIE) = operating income (EBIT) / interest expenses

The higher the TIE, the better

(4) Profitability ratios: show how profitable a firm is operating and utilizing its assets (shows the combined effects)

Operating profit margin = EBIT / sales

Profit margin = net income / sales

Return on assets (ROA) = net income / total assets

Basic earnings power (BEP) = EBIT / total assets

Return on equity (ROE) = net income / common equity

The higher the returns, the better the performance

(5) Market value ratios: relate stock price to earnings and book value and show what investors think about the firm and its future prospects

Price / earnings ratio (P/E ratio) = price per share / earnings per share

Market / book ratio = market price per share / book value per share

- Du Pont equations

ROA = net income / total assets = (net income / sales) * (sales / total assets)
= profit margin * total assets turnover

In order to increase ROA, firms can try to improve profit margin and/or total asset turnover

ROE = net income / common equity
= (net income / sales) * (sales / total assets) * (total assets / common equity)
= profit margin * total assets turnover * equity multiplier

In order to increase ROE, firms can try to improve profit margin and/or total asset turnover and/or equity multiplier

Example 1: Problem 4-10

Given ROA = 3%, ROE = 5%, total assets turnover = 1.5x

Questions:

What is profit margin? Answer = 2%

What is debt ratio? Answer = 40%

Example 2: Problem 4-13

Given ROE was 3% last year; management developed a plan to raise debt ratio to 60% with interest charges of \$300,000; it expects EBIT of \$1,000,000 on sales of \$10,000,000 and a total asset turnover of 2; marginal tax rate is 34%

Question:

What should be new ROE?

Answer: $NI = (1,000,000 - 300,000) * (1 - 0.34) = \$462,000$

$Profit\ margin = NI / Sales = 462,000 / 10,000,000 = 4.62\%$

$Debt\ ratio = 60\% = 3/5, \text{ then } EM = 5/2$

$New\ ROE = profit\ margin * total\ asset\ turnover * EM$

$= 4.62\% * 2 * (5/2) = 23.1\%$

Using financial ratios to assess performance (Table 4.2)

By comparing Allied Food's ratios with the industrial averages, we can see the areas where Allied Food are lacking relative to the industry

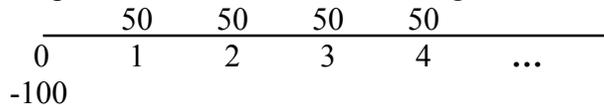
- Trend analysis
Analyzing a firm's financial ratios over time to estimate the likelihood of improvement or deterioration in its financial conditions (Figure 4.1)
- Limitations in ratio analysis
 - Different divisions in different industries
 - Industry average
 - Accounting methods
 - Inflation
 - Window dressing
 - Seasonality
- Beyond the numbers
 - Tied to one customer?
 - Tied to one product?
 - Rely on one supplier?
 - Having operations overseas?
 - Having more competition?
 - Developing future products?
 - Having legal issues?
- **Exercise**
 - ST-1, ST-2, and ST-3
 - Problems: 2, 4, 6, 10, and 11

Chapter 5 -- Time Value of Money

- Time line
- Future value (FV) and present value (PV)
- Future value annuity (FVA) and present value annuity (PVA)
- Perpetuity
- Uneven cash flows
- Semiannual and other compounding periods
- Amortization
- Applications

- Time line

Time line: an important tool used to show timing of cash flows



Cash outflows vs. cash inflows: cash outflows are negative and cash inflows are positive

- Future value (FV) and present value (PV)

FV: the amount to which a cash flow will grow over a given number of periods

Compounding: an arithmetic process of determining the final value of a cash flow or a series of cash flows when compound interest is applied

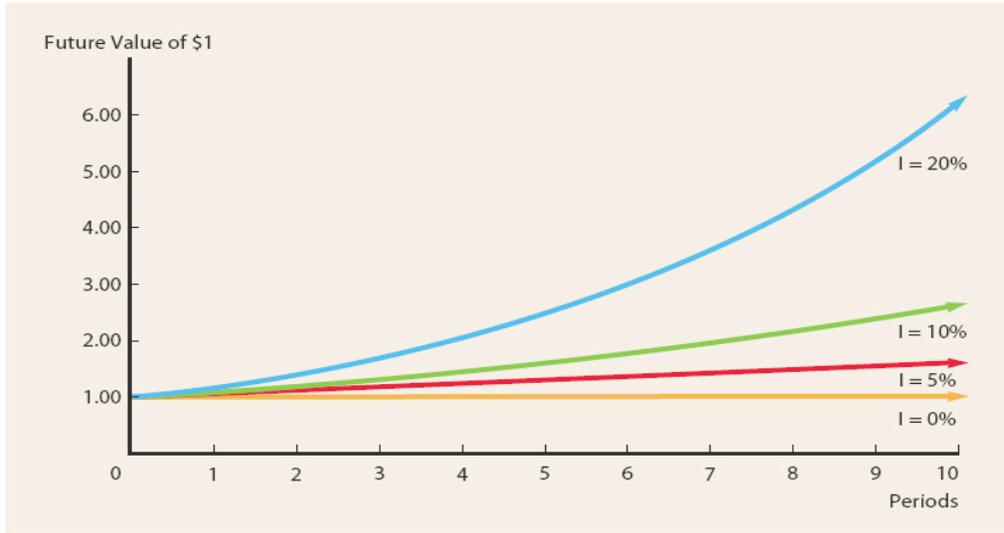
Example: if PV = -\$100, I/YR = 5%, N = 3 years, PMT = 0, FV = \$115.76

Table 5-1		Summary of Future Value Calculations					
	A	B	C	D	E	F	G
14	Investment	= CF ₀ = PV =	-\$100.00				
15	Interest rate	= I =	5.00%				
16	No. of periods	= N =	3				
17		Periods:	0	1	2	3	
18			----- ----- ----- -----				
19		Cash Flow Time Line:	-\$100	→	→	→	FV = ?
20			\$100	→	\$105.00	→	\$110.25
21	<u>Step-by-Step Approach:</u>						\$115.76
22							
23	<u>Formula Approach:</u>	$FV_N = PV(1 + I)^N$		$FV_N = \$100(1.05)^3$	=		\$115.76
24							
25			3	5	-\$100.00	\$0	
26	<u>Calculator Approach:</u>		N	I/YR	PV	PMT	FV
27							\$115.76
28							
29	<u>Excel Approach:</u>	Fixed inputs:	FV _N =	=FV(0.05,3,0,-100)	=		\$115.76
30		Cell references:	FV _N =	=FV(C15,C16,0,C14)	=		\$115.76
31							
32	In the Excel formula, the terms are entered in this sequence: interest, periods, 0 to indicate no intermediate cash flows, and then the PV. The data can be entered as fixed numbers or as cell references.						

The relationship among future value, interest rate, and time

FIGURE 5-1

Growth of \$1 at Various Interest Rates and Time Periods



PV: the value today of a future cash flow

Discounting: a process of finding the present value of a cash flow or a series of cash flows from the future

Example: if $FV = \$115.76$, $I/YR = 5\%$, $N = 3$ years, $PMT = 0$, $PV = -\$100$

Table 5-2

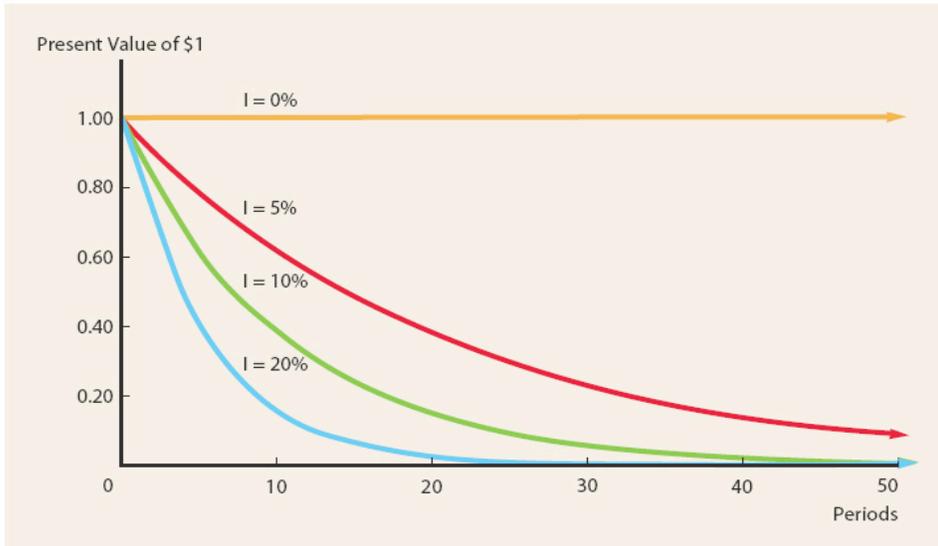
Summary of Present Value Calculations

	A	B	C	D	E	F	G
64	Future payment	= $CF_N = FV =$	\$115.76				
65	Interest rate	= $I =$	5.00%				
66	No. of periods	= $N =$	3				
67			Periods:	0	1	2	3
68				----- ----- -----			
69			Cash Flow Time Line:				
70				PV=? ←	←	←	\$115.76
71	Step-by-Step Approach:			\$100.00 ←	← \$105.00	← \$110.25	← \$115.76
72							
73	Formula Approach:	$PV = FV_N / (1 + I)^N$			$PV = \$115.76 / (1.05)^3 =$		\$100.00
74							
75				3	5	\$0	\$115.76
76	Calculator Approach:			N	I/YR	PV	FV
77						-\$100.00	
78							
79	Excel Approach:		Fixed inputs:	PV =	=PV(0.05,3,0,115.76) =		-\$100.00
80			Cell references:	PV =	=PV(C65,C66,0,C64) =		-\$100.00
81							
82	In the Excel formula, 0 indicates that there are no intermediate cash flows.						

The relationship among present value, interest rate, and time

FIGURE 5-2

Present Value of \$1 at Various Interest Rates and Time Periods



- Future value annuity (FVA) and present value annuity (PVA)
 - Annuity: a series of equal payments for a number of specified periods
 - Ordinary annuity: an annuity with payments made at the **end** of each period
 - FVA: the future value of an annuity for a number of specified periods

Example: if PV = 0, PMT = -\$100, I/YR = 5%, N = 3 years, FVA = \$315.25

Table 5-3 Summary: Future Value of an Ordinary Annuity

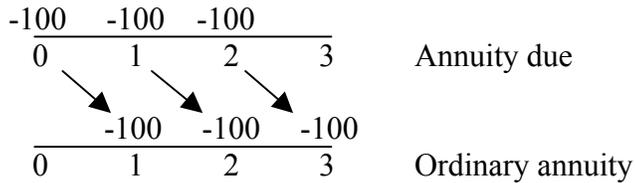
	A	B	C	D	E	F	G
131	Payment amount	= PMT =	\$100.00				
132	Interest rate	= I =	5.00%				
133	No. of periods	= N =	3				
134							
135		Periods:	0	1	2	3	
136							
137		Cash Flow Time Line:					
138		<u>Step-by-Step Approach.</u>					
139		Multiply each payment by					
140		$(1 + I)^{N-t}$ and sum these FVs to					
141		find FVA_N :					
142							
143							
144		<u>Formula Approach:</u>					
145		$FVA_N =$	$PMT \times \left(\frac{(1 + I)^N - 1}{I} \right)$				
146							
147							
148							
149		<u>Calculator Approach:</u>					
150							
151							
152		<u>Excel Function Approach:</u>					
153		Fixed inputs:	$FVA_N =$				
154		Cell references:	$FVA_N =$				
155		Excel entries correspond with these calculator keys:					

	0	1	2	3
		-\$100	-\$100	-\$100
				-\$100.00
				-\$105.00
				-\$110.25
				-\$315.25

	3	5	\$0	-\$100.00	
	N	I/YR	PV	PMT	FV
					\$315.25

	$=FV(0.05,3,-100,0)$	=	\$315.25		
	$=FV(C132,C133,-C131,0)$	=	\$315.25		
	I/YR	N	PMT	PV	FV

Annuity due: an annuity with payments made at the **beginning** of each period



Each payment in annuity due earns one period of additional interest

$$FVA_{\text{due}} = FVA_{\text{ordinary}} * (1 + I/YR) = \$315.25 * (1 + 0.05) = \$331.01 \text{ (use BGN mode)}$$

Note: your calculator has two modes (END for ordinary annuities and BGN for annuity dues) to deal with different types of annuities. Most often, you use END mode to deal with ordinary annuities.

PVA: the present value of an annuity over a number of periods

Example: if $FV = 0$, $N = 3$, $I/YR = 5\%$, and $PMT = -\$100$, then $PVA = \$272.32$ (using END mode for an ordinary annuity)

If it is an annuity due, $PVA = \$285.94$ (using BGN mode)

$$PVA_{\text{due}} = PVA_{\text{ordinary}} * (1 + I/YR) = \$272.32 * (1 + 0.05) = \$285.94$$

Finding annual payments (PMT), periods (N), and interest rates (I/YR)

Example 1: how long will it take to double your money if interest rate is 6%, compounded annually? N = 11.90 years

Example 2: if you want to double your money in 10 years, what should be the annual interest rate? I/YR = 7.18%

Rule of 72: to double your money, $I/YR * N = 72$ (approximation)

Example 3: you have \$15,000 student loan and you want to repay it in next 5 years. The first payment will be made at the end of the year. The annual interest rate is 4%. What should be your annual payment? PMT = \$3,369.41

In the above question, what should be your annual payment if the first payment is made today? PMT = \$3,239.81

Example 4: you win a lottery and face two choices. You can receive a lump sum of \$100,000 today or you will receive \$5,000 per year in next 30 years, starting from today. What is the annual interest rate embedded? I/YR = 3.08%

- Perpetuity
Annuity that lasts forever

Present value of a perpetuity = payment / interest rate = $PMT / (I/YR)$

- Uneven cash flows
A series of cash flows that varies in amount from one period to the other

(1) Annuity plus additional final payment

					1,000
	100	100	100	100	100
0	1	2	3	4	5

If I/YR = 5%

$FV = FVA_{\text{ordinary}} + 1,000 = 552.56 + 1,000 = 1,552.56$

$PV = PVA_{\text{ordinary}} + PV \text{ of } 1,000 \text{ (1,000 discounted at 5\% for 5 years)}$
 $= 432.95 + 783.53 = 1,216.48$

Alternative: $PMT = 100, FV = 1,000, N = 5, I/YR = 5\%$, then $PV = 1,216.48$

(2) Irregular cash flows

Looking for patents or treat each cash flow separately (using CF functions)

	100	300	300	300	500
0	1	2	3	4	5

If I/YR = 5%, then $PV = 1,265.07$ and $FV = 1,614.59$

Naïve way to deal with uneven cash flows: deal with one cash flow at a time

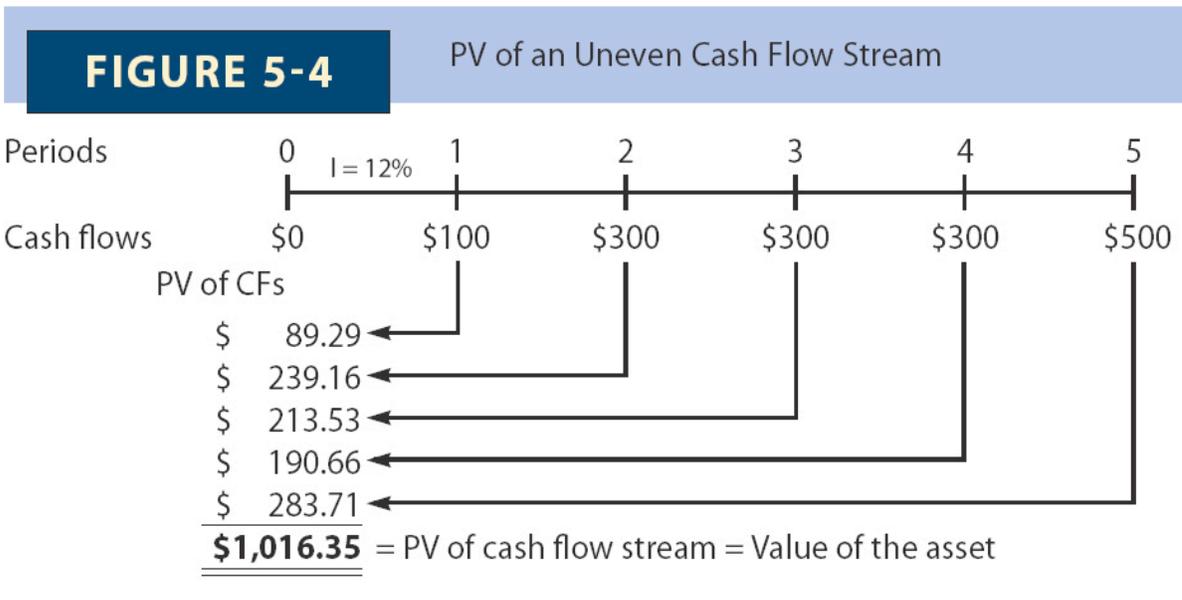
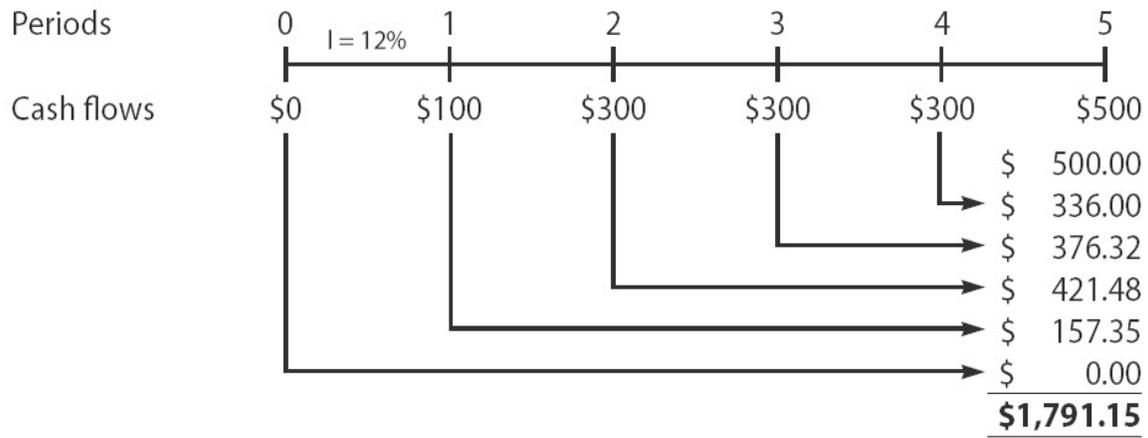


FIGURE 5-5

FV of an Uneven Cash Flow Stream



- Semiannual and other compounding periods

Annual compounding: interest payment is calculated once a year

Semiannual compounding: interest payment is calculated twice a year

Other compounding periods: quarterly, monthly, daily, and continuously, etc.

Effective rate = $(1 + i / m)^m - 1$, where i is the nominal annual rate and m is the number of compounding (for example, for quarterly compounding, $m = 4$)

Example: suppose you have \$1,000 to invest and are choosing among banks A, B, and C. Each bank offers the following nominal annual rate and compounding method.

Bank A: 7% compounded annually

Bank B: 6.9% compounded quarterly

Bank C: 6.8% compounded daily

Question: which bank would you like to choose?

Answer: you should choose Bank B because

Effective rate (Bank A) = 7%

Effective rate (Bank B) = 7.08%

Effective rate (Bank C) = 7.04%

Note: If all three banks offer the same annual rate, which bank should you choose?

Answer: Bank C

Why? Because it offers the highest effective rate

- Amortization

Amortized loan: a loan that is repaid in equal payments over its life

Table 5-4

Loan Amortization Schedule, \$100,000 at 6% for 5 Years

Amount borrowed: \$100,000

Years: 5

Rate: 6%

PMT: -\$23,739.64

Year	Beginning Amount (1)	Payment (2)	Interest ^a (3)	Repayment of Principal ^b (4)	Ending Balance (5)
1	\$100,000.00	\$23,739.64	\$6,000.00	\$17,739.64	\$82,260.36
2	82,260.36	23,739.64	4,935.62	18,804.02	63,456.34
3	63,456.34	23,739.64	3,807.38	19,932.26	43,524.08
4	43,524.08	23,739.64	2,611.44	21,128.20	22,395.89
5	22,395.89	23,739.64	1,343.75	22,395.89	0.00

^a Interest in each period is calculated by multiplying the loan balance at the beginning of the year by the interest rate. Therefore, interest in Year 1 is $\$100,000.00(0.06) = \$6,000$; in Year 2, it is $\$4,935.62$; and so forth.

^b Repayment of principal is equal to the payment of $\$23,739.64$ minus the interest charge for the year.

- Applications

Bond and stock valuations (will be discussed later)

Example 1: saving for your dream car

Your dream car costs \$50,000 now and the price will increase by 4% per year.

The interest rate in a bank is 6% per year. How much should you save every year (in same amount) in next four year (each deposit will be made at the end of the year) in order to buy the car in 4 years? How much should you save every month in next four years to buy the car, assuming each deposit is made at the end of each month?

Answer:

Step 1: price of the car in four years = 58,492.93

(PV = -50,000, I/YR = 4%, N = 4, PMT = 0, FV = 58,492.93)

Step 2: for annual deposit, FV = 58,492.93, I/YR = 6%, N = 4, PV = 0, and solve for PMT to get PMT = \$13,370.99

Step 3: for monthly deposit, FV = 58,492.93, I/YR = 6% / 12 = 0.5%, PV = 0, N = 4*12 = 48, solve for PMT = 1,081.24

Example 2: saving for your retirement

Suppose you save \$100 a month for 10 years, starting from age 20, and invest the money in mutual funds for an average return of 12% per year (1% per month, compounded monthly). How much will you have when you reach 60? At what age will you become a millionaire?

Answer:

Step 1: value of mutual funds when you are 30 years old

$$\text{PMT} = -100, \text{I/YR} = 1\%, \text{N} = 120, \text{PV} = 0, \text{FV} = 23,003.87$$

Step 2: money you will have when retiring

$$\text{PV} = -23,003.87, \text{I/YR} = 1\%, \text{N} = 360, \text{PMT} = 0, \text{and solve for FV}$$

$$\text{FV} = \$826,981$$

Step 3: when FV reaches 1 million

$$\text{PV} = -23,003.87, \text{I/YR} = 1\%, \text{PMT} = 0, \text{FV} = 1,000,000, \text{solve for}$$

$$\text{N} = 379.09$$

$$379.09 / 12 = 31.59 \text{ years}$$

When you are about 62 years old you will become a millionaire.

- **Exercise**

ST-2, ST-3, and ST-4

Problems: 13, 14, 15, 21, 24, 25, and 31