

Module 3

Tools and Inputs

4. Microeconomics
5. Macroeconomics
6. Economics of International Trade
7. Financial Statements
8. Quantitative Concepts

Tools and Inputs

4. Microeconomics

Economics and Scarcity

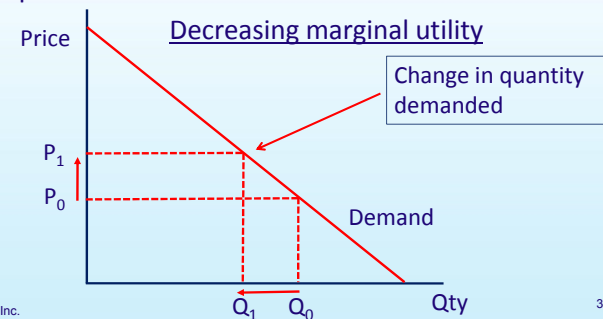
Economics is the study of the allocation of scarce resources

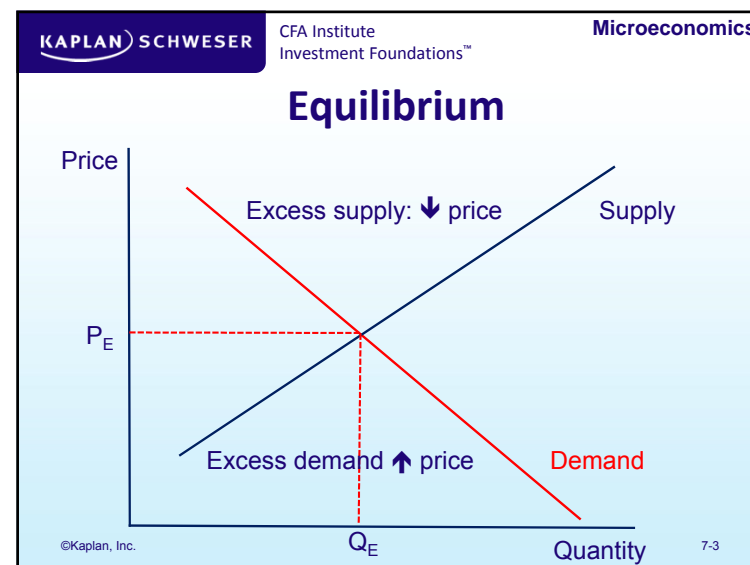
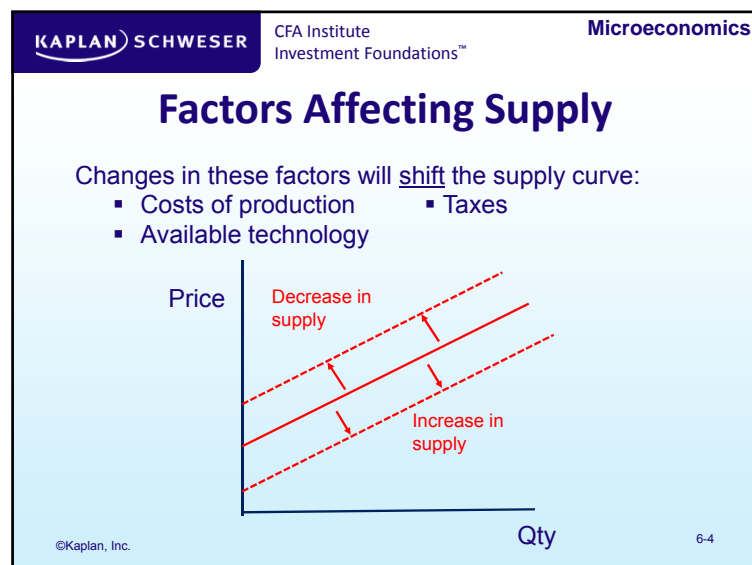
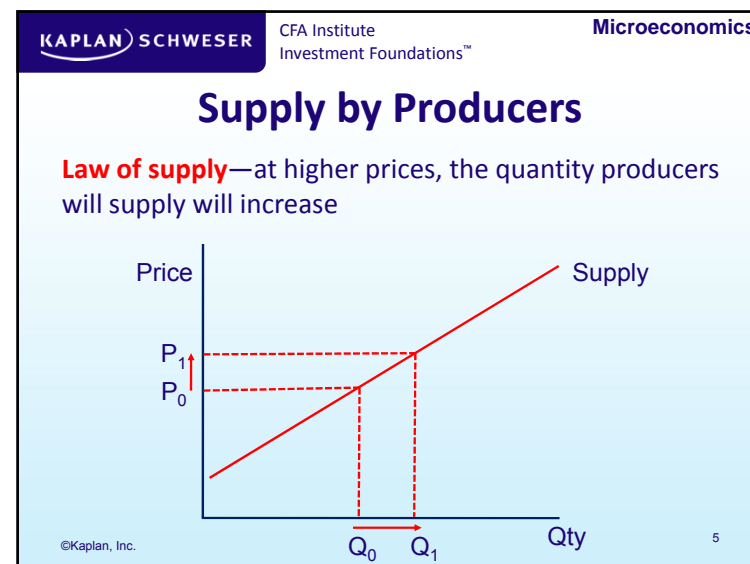
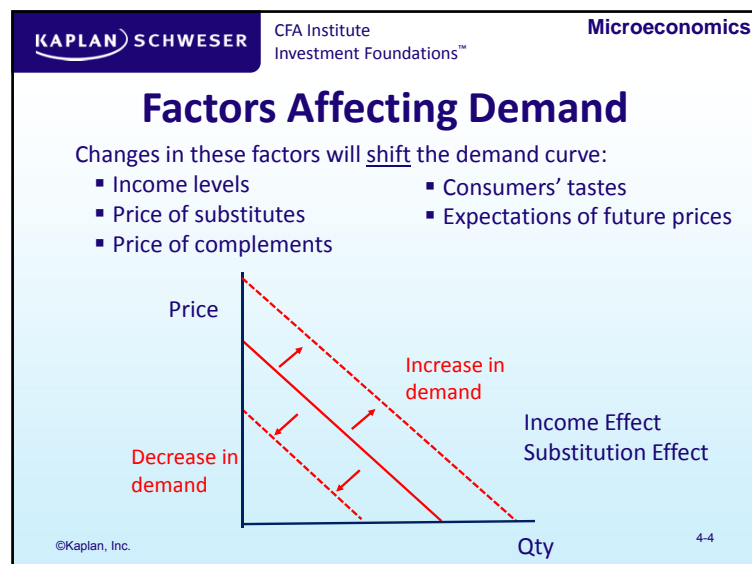
Microeconomics is the study of decisions about scarce resources at the individual and firm level

Macroeconomics is the study of the overall economy; for example, the study of economic growth and employment.

Consumer Demand

Law of demand—greater quantity will be purchased at lower prices





Price Elasticity of Demand

$$\text{Own price elasticity of demand} = \frac{\% \Delta Q}{\% \Delta P}$$

Elastic demand:

% change in quantity demanded > % change in price

Inelastic demand:

% change in quantity demanded < % change in price

Price Elasticity of Demand and Total Revenue

Greatest total revenue ($P \times Q$) at the point where elasticity = -1 (unitary elasticity)

Inelastic range: price increase will increase total revenue

Elastic range: price increase will decrease total revenue

Income Elasticity of Demand

The sensitivity of quantity demanded to changes in income

$$\text{income elasticity} = \frac{\% \text{ change in quantity demanded}}{\% \text{ change in income}}$$

Normal good:

Income ↑ Demand ↑ Income Elasticity > 0

Inferior good:

Income ↑ Demand ↓ Elasticity < 0 (e.g., bus travel)

Cross Price Elasticity of Demand

Price of coffee increases 16% and demand for tea increases 11%

$$\text{cross price elasticity of demand} = \frac{11\%}{16\%} = 0.69$$

cross price elasticity > 0: the goods are substitutes

Price of pizza increases 25% and demand for cola decreases 10%

$$\text{cross price elasticity of demand} = \frac{-10\%}{25\%} = -0.40$$

cross price elasticity < 0: the goods are complements

Accounting Profit and Economic Profit

Accounting profit = revenue – explicit costs

Economic profit = accounting profit – implicit costs

Implicit costs =

opportunity cost of owner's money invested

+ wages owner could have earned

+ return to owner's entrepreneurial skills

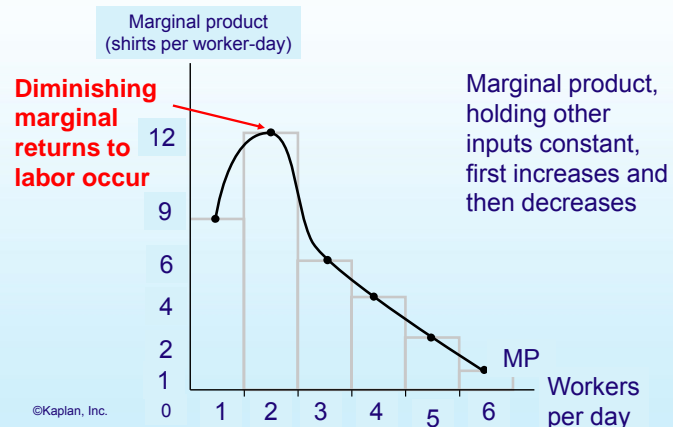
Fixed Costs and Variable Costs

Fixed costs—costs that do not change as output changes

Variable costs—costs that increase with the level of output

Businesses with relatively more fixed costs have more operating leverage

Diminishing Marginal Returns



Factors that Affect Pricing

Products with good substitutes—competition forces prices to or near minimum average cost of production

Unique products—manufacturer must determine price that results in maximum profit; price is greater than minimum average cost

Industry Structure

Perfect Competition

- Many buyers and sellers
- Products not differentiated
- Very low **barriers to entry**
- Firms earn normal profit
- Efficient allocation of resources

For example: wheat, gasoline, currencies, gold

Industry Structure

Monopoly

- Single seller
- High barriers to entry
- No good substitutes
- Firms earn monopoly profits
- Higher price and lower quantity than perfect competition

For example: patented drugs and utilities

Industry Structure

Monopolistic Competition

- Many sellers
- No major barriers to entry
- Products are differentiated
- Competition based on features and marketing

For example: toothpaste, hotels

Industry Structure

Oligopoly

- Few sellers
 - High barriers to entry
 - Products can be differentiated or not
 - Higher than normal profit
 - Firms are interdependent
 - Possible collusion
- For example: aircraft, oil, telecommunications

Types of Industry Structures

	Perfect Competition	Monopolistic Competition	Oligopoly	Pure Monopoly
Number of sellers	Many firms	Many firms	Few firms	Single firm
Barriers to entry	Very low	Low	High	Very high
Nature of substitute products	Very good substitutes	Good substitutes but differentiated	Very good substitutes or differentiated	No good substitutes
Nature of competition	Price only	Price, marketing, features	Price, marketing, features	Preserve monopoly
Pricing power	None	Some	Some to significant	Significant

Tools and Inputs

5. Macroeconomics

Macroeconomics and Investments

- **Macroeconomics:** economy as a whole—economic growth, inflation, interest rates, foreign exchange rates
- Effects on investments:
 - Some firms are more (less) sensitive to economic growth and inflation
 - Bond prices change inversely with interest rates
 - Multinational firms, import/export sector affected by changes in foreign exchange rates

Gross Domestic Product (GDP)

- **GDP:** Total output of goods and services
 - **Nominal GDP:** Current prices; reflects inflation as well as growth in output
 - **Real GDP:** Constant prices; removes effects of inflation
- **GDP per capita:** GDP divided by population

Components of GDP

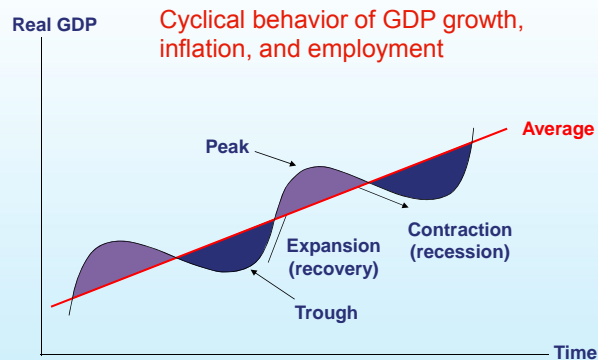
$$\text{GDP} = C + I + G + \text{net } X$$

- **Consumption** spending by individuals
- **Investment** by businesses (e.g., long-lived assets, inventories)
- **Government** spending on goods and services
- **Net exports**: exports minus imports

Economic Growth

- Factors that determine an economy's long-term growth rate:
 - **Workforce**: size, quality
 - **Capital**: productive resources
 - **Natural resources**
 - **Technology**
- Capital, technology, and education can increase economic growth by improving the **productivity** of the workforce

Business Cycles



Global Business Cycles

Over time, business cycles in different countries have become more alike because of:

- Increased international trade
- Increased financial flows
- Increased labor mobility

Economic Indicators

Leading indicators: Turning points tend to precede business cycle peaks and troughs

For example, S&P 500 stock index

Coincident indicators: Turning points tend to occur at the same time as business cycle peaks and troughs

For example, personal incomes

Lagging indicators: Turning points tend to follow business cycle peaks and troughs

For example, unemployment

Inflation

- **Inflation:** increasing prices of most goods and services over time; typically measured by **consumer price index**
- **Deflation:** decreasing prices of most goods and services over time
- **Stagflation:** inflation during business cycle contraction
- **Hyperinflation:** out-of-control high inflation

Effects of Inflation

- Inflation hurts lenders and bondholders because future cash flows will have less purchasing power
- Investors in commodities may gain from inflation
- If consumers expect increasing inflation, they may increase spending now, decreasing savings and reducing the supply of capital
- If consumers expect deflation, they may delay spending, slowing economic growth

Monetary Policy

- Management of money supply, typically by a central bank
- Increasing money supply growth can increase economic growth in the short run but can also cause inflation
- **Monetary policy tools:**
 - Open market operations
 - Central bank lending rate
 - Reserve requirements

Fiscal Policy

- Government spending and tax decisions
- Increasing government spending or decreasing tax rates will tend to increase economic growth by increasing consumers' disposable incomes
- Decreasing government spending or increasing tax rates will tend to decrease economic growth

Policy Limitations

- **Time lags** between policy decisions and effects
- May only increase growth in the short run, while causing **inflation in the long run**
- Effects depend on how people respond
 - Lower interest rates will not increase economic growth if banks are unwilling to lend or consumers and firms are unwilling to borrow
 - Lower tax rates will not increase economic growth if consumers increase savings instead of spending

Tools and Inputs

6. Economics of International Trade

Imports and Exports

Imports: Purchases of goods and services from another country

Exports: Sales of goods and services to another country

One country's imports are another country's exports

Benefits of International Trade

- Obtain goods that cannot be produced domestically
- Reduce costs by importing goods from lower-cost foreign producers
- Competition from foreign firms encourages innovation and efficiency

Comparative Advantage

Absolute advantage refers to lower cost in terms of resources used

Comparative advantage refers to the lowest *opportunity cost* to produce a product

Law of comparative advantage:

- Trade makes **all countries better off**
- Each country specializes in goods they produce most efficiently and trades for other goods

Trade has potential to increase worldwide output and wealth with no country being worse off

Comparative Advantage

Labor/unit	Cloth	Wine
England	100	110
Portugal	90	80

- Portugal has absolute advantage in both wine and cloth
- England has comparative advantage in cloth
- Portugal has comparative advantage in wine
- If Portugal specializes in wine production and England specializes in cloth production, both can be better off

Balance of Payments

Current account: Trade in goods and services

- Exports > imports: current account surplus
- Imports > exports: current account deficit
- A country with negative net savings will have a current account deficit

Capital account: Financial, investment flows

- A country with a current account deficit must have a capital account surplus
- A country with a current account surplus must have a capital account deficit

Exchange Rates

Exchange rate: Price of one currency in terms of another currency

- **Fixed** (managed by countries to maintain a constant value) or **floating** (market-determined)
- Most exchange rates are floating
- A currency **appreciates** when it becomes more valuable relative to another currency, or **depreciates** when it becomes less valuable relative to another currency

Factors Affecting Currency Values

- Trade surplus → appreciation
- High interest rates → appreciation
- High inflation → depreciation
- High government debt → depreciation
- Poor economic growth → depreciation
- Unstable politics → depreciation

Relative Strength of Currencies

- Currencies may become overvalued or undervalued relative to other currencies
- **Purchasing power parity:** If two currencies are fairly valued, the same basket of goods should cost the same in either currency
 - Tends to hold in long run
 - May not hold in short run due to trade barriers, transportation costs, perishability of goods

Foreign Exchange Market

- Large, very liquid dealer market
- Bid-ask spreads for each currency pair
 - Example: **USD/GBP 1.5520–1.5560**
 - Dealer will buy one GBP for 1.5520 USD
 - Dealer will sell one GBP for 1.5560 USD
 - Dealer will buy one USD for 0.6427 GBP
 - Dealer will sell one USD for 0.6443 GBP
 - Whichever currency you are buying or selling, you get the bid or ask that is worse for you

Spot and Forward FX

Spot market: Exchange currencies today

Forward market: Exchange currencies in the future at an exchange rate agreed on today

- Firms can use forward market to hedge currency risk of future cash flows in a foreign currency

Tools and Inputs

7. Financial Statements

Financial Statements Standards

- Standard setting organizations
 - Generally Accepted Accounting Principles (GAAP)—U.S.
 - International Financial Reporting Standards (IFRS)—many other countries
- Examples of securities regulators
 - Securities and Exchange Commission (SEC)—U.S.
 - Financial Services Authority (FSA)—U.K.
 - International Organization of Securities Commissions (IOSCO)—many other countries

Financial Statements

- **Balance sheet**—at a point in time
$$\text{Assets} = \text{Liabilities} + \text{Equity}$$
- **Income statement**—shows income, expenses, and profit or loss for a period of time
- **Cash flow statement**—shows cash received and cash paid out over a period
- **Notes to the financial statements**—provide additional information, part of financial statements

Balance Sheet (assets)

Cash—includes short term low-risk marketable securities

Accounts receivable (AR)—money owed on credit sales

Inventory—raw materials, goods in process, finished goods

Total current assets—to be converted to cash in less than one year

Gross PPE—physical assets

Accumulated depreciation—PPE expensed to date

Net PPE—cost of PPE not yet expensed, “net book value”

Intangible assets—for example, patent, trademark, goodwill

Total non-current assets—not converted to cash within one year

Total assets—total value of all resources owned by the firm

Balance Sheet (Liabilities and Equity)

Accounts payable (AP)—amount owed to suppliers

Accrued liabilities—for example, wages between paydays

Current portion of long term debt—to be paid within one year

Total current liabilities—expected to be paid within one year

Long Term Debt

Total non-current liabilities—not due within one year

Total liabilities—all the claims against the company's assets

Common stock—net amount raised from selling common stock

Retained earnings—past net income not paid out as dividends

Total owners' equity—total assets minus total liabilities

Total liabilities and equity—must equal assets to “balance”

Income Statement

Revenues—total sales of the firm's products less returns

Cost of Goods Sold (COGS)—direct cost of producing the products

Gross profit—difference between sales and cost of production

Selling expenses—from marketing and sales activities

General/administrative expenses—overhead, corporate offices

Depreciation expense—decrease in value of PPE

Total other operating expenses

Operating income—earnings before interest and taxes (EBIT)

Interest expense—interest on debt accrued for the period

Earnings before taxes (EBT)

Income taxes

Net income—this is the increase in equity before dividends

Profit Versus Net Cash Flow

Profit or net income

— Found on income statement

— Presented on **accrual basis**

Operating cash flow

— Found on cash flow statement

— Presented on **cash basis**

Cash Flow Statement Items

The statement of cash flows has **three components**:

- Cash provided or used by **operating** activities
- Cash provided or used by **investing** activities
- Cash provided or used by **financing** activities

Cash Flow Statement

Operating activities

Net income

+ depreciation – *an expense but not paid in cash*

- increase in AR – *credit sales more than cash received*

+ decrease in inventory – *an expense in NI, paid for previously*

+ increase in AP – *materials expense but not yet paid for in cash*

Net cash flow from operating activities

Cash Flow Statement

Investing activities

Net investment in PPE

Net cash flow from investing activities

Financing activities

Cash used to pay down debt

Cash from issuance of new shares

Cash dividends paid

Net cash flow from financing activities

Net increase (decrease) in cash from prior period

Cash Flow Classifications: Operating Cash Flows

- Cash from customers (inflow)
- Cash to suppliers (outflow)
- Wages paid (outflow)
- Payment of rent and overhead (outflow)
- Income taxes paid (outflow)
- Interest paid (outflow)

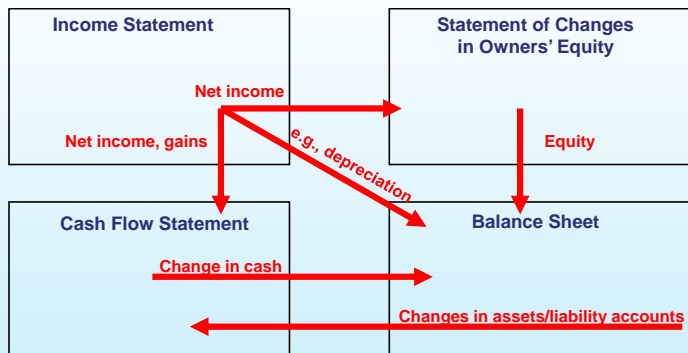
Cash Flow Classifications: Investing Cash Flows

- Purchase of long-term assets (outflow)
- Sale of long-term assets (inflow)
- Purchase of long-term securities (outflow)
- Sale of long-term securities (inflow)

Cash Flow Classifications: Financing Cash Flows

- Sale of new stock (inflow)
- Repurchase of outstanding stock (outflow)
- Issuance of new debt (inflow)
- Retirement of existing debt (outflow)
- Payment of dividends (outflow)

Links Between Income Statement, Balance Sheet, and Cash Flow Statement



Usefulness of Ratio Analysis

Ratios are used to evaluate company performance and for firm valuation

Firm's ratios must be compared to the ratios of:

- Another firm
- Average of group of peer firms
- Same firm from one period to the next

Firms in different industries not comparable

Categories of Ratios

- **Liquidity ratios**—ability to meet obligations
- **Profitability ratios**—ability to generate earnings from firm sales, assets, or equity
- **Financial structure ratios**—use of debt
- **Return to shareholders**
- **Market value ratios**—based on share price

Liquidity Ratios

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

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

Profitability Ratios

$$\text{Net profit margin} = \frac{\text{Net income}}{\text{Revenue}}$$

$$\text{Operating profit margin} = \frac{\text{Operating earnings}}{\text{Revenue}}$$

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

Profitability Ratios

$$\text{Return on equity} = \frac{\text{Net income}}{\text{Shareholders' equity}}$$

$$\text{Asset turnover} = \frac{\text{Revenue}}{\text{Total assets}}$$

$$\text{Basic earning power} = \frac{\text{Operating earnings}}{\text{Total assets}}$$

Financial Ratios

$$\text{Debt to equity} = \frac{\text{Debt}}{\text{Equity}}$$

$$\begin{aligned} \text{Financial leverage} &= \frac{\text{Total assets}}{\text{Equity}} \\ &= \frac{\text{Debt} + \text{Equity}}{\text{Equity}} = \frac{\text{Debt}}{\text{Equity}} + 1 \end{aligned}$$

Return to Shareholders

$$\text{ROE} = \frac{\text{Net income}}{\text{Equity}} =$$

$$\frac{\text{Net income}}{\text{Revenue}} \times \frac{\text{Revenue}}{\text{Total assets}} \times \frac{\text{Total assets}}{\text{Equity}}$$

\uparrow Net profit margin \uparrow Asset turnover \uparrow Financial leverage

Market Value Ratios

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

$$\text{Price-to-book ratio} = \frac{\text{Market price per share}}{\text{Equity book value per share}}$$

Tools and Inputs

8. Quantitative Concepts

Concept of Interest

Money today preferred to money later

Interest rate compensates lender

- For not having use of money—opportunity cost
- For uncertainty—risk
- Interest rates are usually quoted as annual percentage rates (APR)

Simple Versus Compound Interest

Simple interest

- Annual interest if interest payments are not reinvested
- Annual percentage rate (APR)

Compound interest

- Total interest earned over a period if interest payments are reinvested (interest on interest)
- Effective annual rate (EAR)

Simple Versus Compound Interest

Example \$1,000 deposit APR = 10%

With annual compounding, \$100 interest paid at the end of the year, effective annual return is 10%.

With semiannual (twice per year) compounding

5% paid after six months: $1,000 \times 5\% = \$50.00$

5% paid after one year: $1,050 \times 5\% = \underline{\$52.50}$

Total interest earned over the year: $\$102.50$

Effective annual return (EAR) = 10.25%

Effective Annual Rates

For a **stated annual rate** of 12%:

Annual Compounding EAR = 12%

Semiannual Compounding (6% every six months)

$EAR = 1.06^2 - 1 = 12.36\%$

Quarterly Compounding (3% every three months)

$EAR = 1.03^4 - 1 = 12.55\%$

Monthly Compounding (1% every month)

$EAR = 1.01^{12} - 1 = 12.68\%$

The more frequent the compounding, the greater the effective annual return

Effects of Time and Discount Rate on Value

Discounting —value today (present value) of future amount

Value of \$1,000 in the future discounted at 10% and 5%

Discount rate = 10%

Years until received	Value today (present value)
One year	$\$1000/1.10 = \909.09
Two years	$\$1000/1.10^2 = \826.45
Three years	$\$1000/1.10^3 = \751.31

Discount rate = 5%

Years until received	Value today (present value)
One year	$\$1000/1.05 = \952.38
Two years	$\$1000/1.05^2 = \907.03
Three years	$\$1000/1.05^3 = \863.84

- Lower discount rate, higher present value
- Longer time period, lower present value

Using Net Present Value to Value an Investment

Net present value (NPV) is the present value of all expected future cash flows minus initial cost of investment:

$$NPV = CF_0 + \frac{CF_1}{(1+k)^1} + \frac{CF_2}{(1+k)^2} + \dots + \frac{CF_n}{(1+k)^n}$$

Example: Project X, discount rate = 9%

End of Year	Project X	Discounted Cash Flow	
0	-\$100	-\$100.00	-100.00
1	25	22.94	+ 22.94
2	50	42.08	+ 42.08
3	75	57.91	+ 57.91

NPV = \$22.93

Annuities

- An **annuity** is a series of periodic cash flows of equal amount
- A mortgage or car loan is an annuity
- The present value of the future payments is the amount borrowed
- Each payment pays monthly interest and reduces the amount owed

Mortgage Example

Borrow \$100,000 for 30 years at 4% APR with equal monthly payments (amortizing loan)

Monthly payment is \$477.42

Each payment is one month interest + principal paydown

First payment: interest \$333.33, principal \$144.09

100th payment: interest \$276.44, principal \$200.98

Last payment: interest \$1.59, principal 475.83

Descriptive Statistics

Random variable—an uncertain number or a quantity that takes on a value that is unknown

- A **probability distribution** gives the probabilities of all possible outcomes for a random variable
- A **discrete distribution** has a finite number of possible outcomes (e.g., number of days it will rain next week)
- A **continuous distribution** has an infinite number of possible outcomes (e.g., return on an investment portfolio)

Measures of Central Tendency

Arithmetic mean—the average of a set of values

Returns over three years are: +5%, −3%, +10%

$$\text{Mean} = \frac{5 - 3 + 10}{3} = 4\%$$

Geometric mean—average compound growth rate

$$\text{Geometric mean} = [(1 + 5\%) \times (1 - 3\%) \times (1 + 10\%)]^{\frac{1}{3}} - 1 = 3.86\%$$

$$\$100 \times (1 + 5\%) \times (1 - 3\%) \times (1 + 10\%) = \$112$$

$$\$100 \times (1 + 3.86\%) \times (1 + 3.86\%) \times (1 + 3.86\%) = \$112$$

Measures of Central Tendency

Median—midpoint of a data set

Half of the values are above the median and half the values are below the median

- With an odd number of observations
2, 5, **7**, 11, 14 Median = 7
- With an even number of observations, median is the average of the two middle observations
3, 9, 10, 20 Median = $(9 + 10) / 2 = 9.5$

Less affected by **outliers** than the mean

Measures of Central Tendency

Mode—most frequently occurring value in a data set

Data: 2%, 4%, 5%, 5%, 7%, **8%, 8%, 8%**, 10%, 12%

Mode = 8

Data sets can have more than one mode

Measures of Dispersion

Range

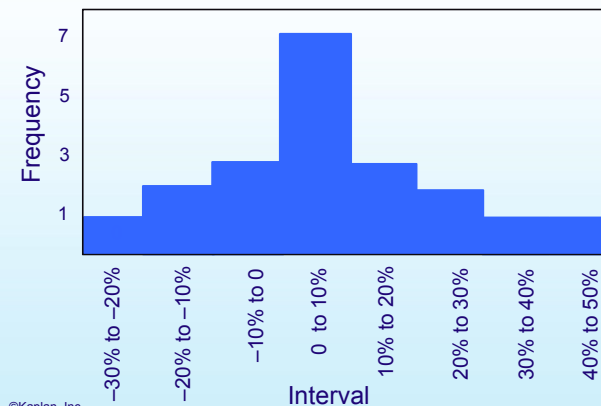
- Difference between the highest and lowest values
- Sensitive to outliers

Percentile — 90th percentile is greater than 90% of obs.

Standard deviation

- Measure of average dispersion around the mean
- Square root of variance
- Always positive

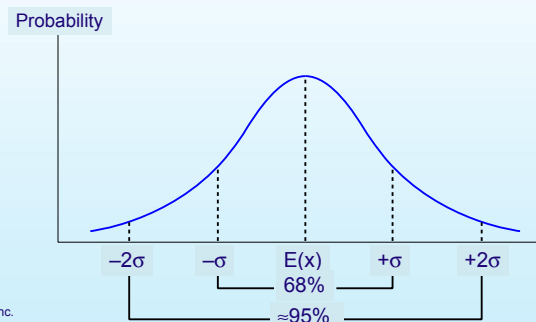
A Histogram



Characteristics of a Normal Distribution

Mean = Median = Mode

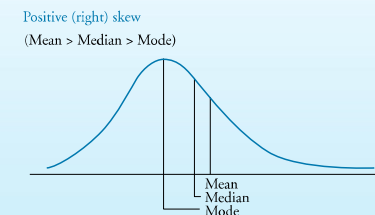
Distribution is **symmetric** around the mean



Skewed Distribution

A distribution that is not symmetric may be positively or negatively **skewed**

Example of positive skew:



Correlation

- A standardized measure of the relationship between the values of two variables
- Values range from +1, perfect positive correlation, to -1, perfect negative correlation
- The further the correlation is from zero, the stronger the relationship between the two variables
- Correlation does not imply causation

Autocorrelation

We can also examine correlation of one period's value with the next period's value for a single variable

Called **autocorrelation** or **serial correlation**