



AFM 273



AFSA
EDUCATION

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materials and happy studying!

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Week 1: Time Value of Money

Terms

Present Value (PV): Value of money to be received at a later date after adjustment for the required reward for lost opportunity and risk

Future Value (FV): Future value of money held now after adjustment for expected rate of return

Interest Rate (r): “exchange rate” between present money and future money

Real Estate Investment Fund (REIT): They own, operate, or finance income-producing real estate. They are not subject to corporate income tax, and are rather taxed through the income tax of the person who holds the REIT.

Notations

PV = Present Value

FV = Future Value

C = Cash Flow

r = interest rate

T = number of years

m = number of periods

n = total number of periods ($n = m \times T$)

NOTE: often use subscripts to indicate time e.g. C_t is a cash flow occurring at time t

Reasons for difference in money today and money in the future

1. Inflation

- Change in price levels overtime

2. Payment in the future is not guaranteed

- This risk is referred to as “Default risk”

3. Lost Opportunity

- The same capital could be used for other investments, also known as “opportunity cost”

Discount rate = inflation + opportunity cost + default risk

Three Fundamental Rules

1. Only cash flow values at the same point in time can be compared/combined

2. To move a cash flow forward in time, you must COMPOUND it

a. To compound a cash flow for n periods, multiply it by $(1+r)^n$

b. **Future Value:** The value of a cash flow moved forward in time

c. **Simple Interest:** When you earn interest on principal but not on accrued interest

d. **Compound Interest:** When you earn interest on both principal and accrued interest

Example: You invest \$100 in an account paying 6% interest per year. How much will you have in 8 years?

$$FV_n = C_0 * (1 + r)^n$$

$$\$100 * (1 + 0.06)^8 = \$159.38$$

3. To move a cash flow backward in time, you must DISCOUNT it

a. To discount a cash flow for n periods, divide it by $(1+r)^n$

b. **Discounted Value:** The value of a cash flow moved backward in time

c. **Present Value:** The value today of a future cash flow

Example: You invest in a bond that will pay you \$1000 in 3 years, what is the price of the bond today if the risk-free interest rate is 5%?

$$PV_n = C_0 / (1 + r)^n$$

$$\$1,000 / (1 + 0.05)^3 = \$863.84$$

Quoted Interest

- Interest has two components:
 - Interest rate
 - Frequency with which interest is applied (semi-annual, quarterly, etc.)

Annual Percentage Rates (APR)

- The amount of simple interest earned in one year (amount of interest earned without the effect of compounding)

Example: a quarterly rate of 4% would be expressed as a 16% APR with quarterly compounding

- In order to compute the actual amount earned in one year, you must convert the APR to EAR

Example:

At the end of the first year, if \$1000 was borrowed with a quarterly interest rate of 4%:

$$FV_4 = P_0(1+r)^t = -1000(1+0.04)^4 = -1169.8590$$

Using APR would NOT WORK because you would get:

$$FV_1 = P_0(1+r)^t = -1000(1+0.16)^1 = -1160.00$$

Multiplying a quarterly rate by 4 to create an APR does not accurately account for the compounding frequency

APR Conversion Formula

$$EAR = \left(1 + \frac{APR}{m}\right)^m - 1$$

- Going back to the previous example, the EAR would be:

$$APR = 16\% \Rightarrow EAR = \left(1 + \frac{16\%}{4}\right)^4 - 1 = 16.9859\%$$

Followed by:

$$FV_1 = P_0(1+r)^t = -1000(1+0.169859)^1 = -1169.859$$

Effective Rates

- Using the APR conversion formula (above) accurately adjusts for the differences in compounding frequency
- However, we must use the effective rate consistent with the frequency of the cash flows
- Use the effective rate conversion formula (below) to calculate effective rates with the same compounding frequencies as our cash flows

Effective Rate Conversion Formula

$$ESR = (1 + EAR)^{\frac{1}{n}} - 1$$

APR Shorthand Conversions

- Any APR can be divided by its compounding frequency to obtain the underlying effective rate
Example: APR of 6% with monthly compounding = effective monthly rate of 0.5% ($\frac{6}{12}\%$)
With monthly compounding, we divide the APR by 12 because there are 12 months in a year
- The effective rate conversion formula can then be used to obtain any other effective rate with a different compounding frequency

Perpetuities and Annuities

Regular Perpetuity

- Fixed payment each period for perpetuity
- Assume that the 1st cash flow occurs at the end of time 0 (beginning of time 1)
- **Formula for PV of Regular Perpetuity:**

$$PV = \frac{C}{r} \quad (C = \text{Cash flow}, r = \text{Interest rate})$$

Example: How much will it cost to endow an annual party for forever if the budget is \$30,000 per year and the interest rate is 8%?

$$PV_0 = C / r = \$30,000 / 0.08 = \text{\$375,000 donated today}$$

Growing Perpetuity

- Payment increases by the same % every period for perpetuity
- Assume $r > g$
- **Formula for PV of Growing Perpetuity:**

$$PV = \frac{C_1}{r - g} \quad (g = \text{growth rate of payments})$$

Example: How much would you need to donate if a budget of \$30,000 increases by 4% every year with an interest rate of 8%? Assume that the cost of the 1st party is \$30,000.

$$PV_0 = C_1 / (r - g) = \$30,000 / (0.08 - 0.04) = \text{\$750,000 today}$$

Regular Annuity

- Series of cash flows of the same amount paid only for a set period of time
- Assumption: 1st payment (cash flow) is received in one period from today (time 0)
- **Formula For PV of Regular Annuity:**

$$PV = \frac{C}{r} \left[1 - \frac{1}{(1+r)^T} \right]$$

Example: You win a \$30 million lottery prize and will receive the money in 30 payments of \$1 million per year (payment starts in one year). How much are the payments worth today, if the interest rate is 8%?

$$\$1,000,000 / 0.08 * (1 - 1/(1.08)^{30}) = \$11,257,783.34$$

30 payments of \$1 million is worth **\$11,257,783.34 today**

- **Formula For FV of Regular Annuity:**

$$FV = C * \frac{1}{r} ((1 + r)^n - 1)$$

Example: In total, how much will be saved in your RRSP when you are 65 years old if you save \$10,000 each year starting at age 35 with an annual rate of 10%?

$$FV = 10,000 * 1/0.1 * ((1 + 0.1)^{30} - 1) = \$1,644,940.23$$

You will have in the RRSP at age 65 is **\$1,644,940.23**

Growing Annuity

- Cash flow/ payment increases by the same % each period
- Assume $g \neq r$
- **PV of Growing Annuity formula:**

$$PV = \frac{C_1}{r-g} \left[1 - \frac{(1+g)^T}{(1+r)^T} \right]$$

- **FV of Growing Annuity formula:**

$$FV = \frac{C}{r-g} ((1 + r)^n - (1 + g)^n)$$

Week 1: Time Value of Money Practice Questions

1. Which of the following is not a factor that affects the discount rate?
 - a. Default risk
 - b. Opportunity cost
 - c. Interest rate
 - d. Inflation
2. You must _____ your cash flows to calculate their present value.
 - a. Discount
 - b. Compound
3. A series of never ending cash flows at a growing rate would be considered a _____.
 - a. Growing perpetuity
 - b. Growing annuity
 - c. Perpetuity
 - d. Annuity
4. When calculating for the future value of cash flows, the present value is divided by the compounded interest.
 - a. True
 - b. False
5. What is the present value of 10 annual payments of \$100 if the discount rate is 4%?
 - a. 743.53
 - b. 811.09
 - c. 792.21
 - d. 843.53

Week 2: Bond Valuation

Bonds Cash Flows, Prices, and Yields

- **Bond:** a security sold by govt or corporations (**issuer**) to raise money from **investors** (lenders) in exchange for a promised future payment as a form of debt
 - Value of a bond is the present value (PV) of all future cash flows, such as the *remaining coupon payments* and final *face value*
 - Interest payments are usually made semi-annually unless stated otherwise
 - Cash flows are known and more guaranteed, bearing less risk than equity holders
- **Bond Indenture:** legal contract indicating amounts and dates of all payments to be made
- **Maturity:** the date on which the face value is repaid and the bond ends
- **Term:** time remaining until repayment date
- **Yield to Maturity (YTM):** bond's discount/interest rate
- **Striped Bond:** coupons have been removed and sold separately, not including the face value of the original bond
- **Zero-Coupon Bonds:** no coupon payments, receiving just the face value at maturity, and thus always trading at a discount [$P < FV$] as pure discount bonds
 - EX: Treasury bills - Government of Canada bonds with a maturity of up to one year

Bonds typically make two payments to holders:

Face Value/Par Value (principal)	● The amount being lent per bond certificate = future value ● Usually repaid at maturity and base 10
Coupons	● Promised interest payments of the bond ○ Coupon Rate (r_c): the rate of interest being paid on the face value quoted as an APR ■ Set by issuer and stated on bond indenture ■ NOT the same as discount rate ○ Coupon Payments ■ An annuity determined by converting the APR into the effective rate that matches the <i>frequency</i> of cash flows, then multiplying it by the amount of the loan (FV) Coupon Payments = Effective Coupon Rate * Face Value

Discount Rates = YTM

- An appropriate Interest rate necessary to fairly compensate an investor for lending money today and expecting repayment in the future
- Includes 3 components:
 1. **Inflation**

- Rate of interest on an investment must cover loss in *purchasing power* (expected rate of inflation) over the life of the loan
- Expected inflation uses historical averages and projected growth rates in the economy
- Predictable and stable rates desirable for investors, reducing the risk that inflation may be higher than expected

2. Opportunity Cost

- During contraction periods, there are fewer investors with money to invest and opportunity costs increase
- A long-term investment now at a fixed rate possibly means foregoing future investment opportunities at a higher rate

Inflation + Opportunity Cost = Risk Free Rate

- **Risk Free Rate of Return:** the interest rate that reflects inflation and opportunity costs collectively (virtually default risk free) → government bonds since gov can print money
- 3-month US Treasury interest rate may be used as an estimate for short-term risk free rate

3. Default Risk

- Rate of interest must compensate the investor for bearing the risk that the borrower will default
- The more likely default becomes, the higher the interest rate demanded by investors as a compensation

Time Varying Bond Discount Rates

- At the time a bond is issued, the coupon rate and the yield to maturity are usually set equal
 - Coupon rate is locked in, and thus, cannot change during the bond's term
 - Discount Rate (YTM) change over time according to inflation expectations, opportunity costs, and default likelihood changes
- The value of a bond decreases as the YTM increases
 - An increase in YTM means that we are discounting future cash flows by a higher discount rate, so PV of cash flows is lower, and thus, the bond is worth less today
- Shorter-term bonds and higher coupon rates (pay higher cash flows upfront) are less sensitive to changes in interest rates than bonds with longer term to maturity and lower coupon rates
 - Duration is then used to measure sensitivity of bond's price to changes in interest rates

Bond may trade at:

At Par

- A price equal to their face value in today's money
- Bond is sold at par when the current market interest rate = the coupon rate
- $YTM = \text{Coupon Rate}$
- Said to be trading at 100%

	<i>Example:</i> Company X has a \$1K (par value) bond with a 2 year maturity and 10% coupon rate with semi-annual payments $P(1.10)(1.10) = \$1000$ $(1.1)^2 = \$1000$ $P = 1000/(1.1)^2$ $P = \$826 \leftarrow \text{present value}$
Discount (below par)	• A price lower than face value, trading below 100% • YTM > Coupon Rate • One or more of the factors influencing YTM must have increased since bond was issued if at par <i>Example:</i> When interest rate increases to 15%, you expect the bond price of \$1K to drop (bond would trade at a discount to par) $P(1.15)(1.15) = \$1000$ $(1.15)^2 = \$1000$ $P = 1000/(1.15)^2$ $P = \$756 \leftarrow \text{present value}$
At Premium (above par)	• A price greater than face value, trading above 100% • YTM < Coupon Rate • Investors are being overcompensated for the risk they are bearing ◦ Suggests that default risk, inflation expectations or opportunity costs have decreased since bond was issued if at par <i>Example:</i> When interest rate decreases to 5%, you expect the bond price of \$1K to rise (bond would trade at a premium to par) $P(1.05)(1.05) = \$1000$ $(1.05)^2 = \$1000$ $P = 1000/(1.05)^2$ $P = \$907 \leftarrow \text{present value}$

Arbitrage

- Should be ostentatious, risk-free, and none of your own money
 - The main goal of arbitrage is to buy low and sell high

Week 2: Bond Valuation Practice Questions

1. Which of the following statements is true about bonds?
 - a. The coupon rate does not equal the YTM
 - b. All bonds must have coupon payments
 - c. Not all bonds have bond indentures
 - d. Bonds usually pay interest semi-annually
2. If the Yield-to-Maturity is greater than the coupon rate:
 - a. The bond is not trading
 - b. The bond is trading at a discount
 - c. The bond is trading at par
 - d. The bond is trading at premium
3. Which of the following statements accurately describes a bond and risk relationship?
 - a. As interest rates increase, bond value stays constant over time
 - b. As bond maturity increases, there is decreased sensitivity to interest rate fluctuations
 - c. As coupon value increases, there is increased sensitivity to interest rate fluctuations
 - d. None of the above
4. XYZ Company issues both debt instruments and equity shares. You own a bond whose default risk is equivalent to that of a US Treasury Bond (~3.54% as of October 30, 2021). Individuals who own shares of XYZ Company bear a total risk of 13%. Which of the following statements accurately depicts the lower and upper-limits of the YTM for the bond?
 - a. The lower limit for the bond's YTM is 3.54% and the upper limit is 13%.
 - b. The lower limit for the bond's YTM is 2% and the upper limit is 13%.
 - c. The lower limit for the bond's YTM is 13% and the upper limit is 2%.
 - d. The lower limit for the bond's YTM is 2.5% and the upper limit is 13%.
5. Which of the following statements accurately describes the reasons why a bond would hypothetically trade at a premium?
 - a. The bond's YTM is greater than that of the current market's interest rates
 - b. Investors are being overcompensated for the bond based on the current risk
 - c. The bond's YTM is less than that of the current market's interest rates
 - d. Both A and B are correct
6. Silver is trading for \$30/oz in New York but for €26/oz in Paris. The USD/Euro exchange rate is 1.15. Is there an arbitrage opportunity?
 - a. No, prices are equal after conversion
 - b. Yes, buy silver in Paris and sell in New York
 - c. Yes, buy silver in New York and sell in Paris
 - d. Not enough information to determine

Week 3: Understanding Firm and Industry

PESTEL Analysis:

- Political, Economic, Social, Technological, Environment, Legal

Political Analysis

- Relate to the rules, regulations and actions established by governing bodies or resulting from their failures to govern effectively that impact the firm
- Ex. wars, conflicts, tariffs, import limits, taxes, labor code, corruption, property rights, human rights, education system, political stability, health care, and laws impacting sale and production of goods

Economic Factors

Strategic analysis: the process of understanding the firm - what drives risks, profitability, and the competitive advantage of the firm

Top Down Approach: a valuation approach which starts with an economic analysis

Global economy → domestic economies → industry performance → company analysis

Global Economy Analysis: to determine the dependency of a company on global economic conditions, you could consider

- Proportion of sales and operations which are domestic vs. foreign
- Portion of supply chain reliant on foreign sources
- Location of competitors' operations
- Expected economic growth rates
- Political and currency risk



Terms	Definitions
GDP	• Measure of macro-economic performance • Indicators of GDP growth include unemployment rate, consumer spending, business productivity, and housing
Interest Rates	• Cost of borrowing money ◦ Rate the firm must pay for its own capital will influence projects (rates increase → decrease in positive NPV) ◦ Lower interest rates = more consumer spending
Inflation	• Rises in price levels (lowers purchasing power) • Inflation uncertainty increases risk of investing and impacts credibility of domestic currency and economy

Foreign Exchange Rates	• Inputs and outputs sold by domestic businesses are transacted in foreign currencies • Exchange rates influence the relative cost of foreign and local substitutes potentially which impacts sales
Oil/Commodity Prices	• Commodity prices affect cost of business • Increases in oil impact transportation and energy costs of a business
Hedging	• Hedging activities means any transaction intended to reduce economic risk (protect) • Firm's sensitivity to commodity prices, exchange rates and interest rates is influenced by hedging activity

Social Factors

- Include shifts in demographics and associated consumer behaviour
- Norms of a country/general trends can be amplified via social media
- As a population ages, there are very predictable patterns in consumer spending
- Ex. social norms for buying food different in EU and NA

Technology Factors

- Innovations in tech that may impact the firm via shipping efficiency, production process or user interaction with the product or consumer preferences
- Tech evolution could make a product/company obsolete

Environmental Factors

- Natural systems impacts of the firms activities such as carbon output, degradation of ecosystems due to raw material extraction or urban expansion, pollution and water use
- Also considering the social system impacts of the firm's activities such as racial and gender inequality, environmental racism, children's rights, human and labour rights and diversity and inclusion

Legal Factors

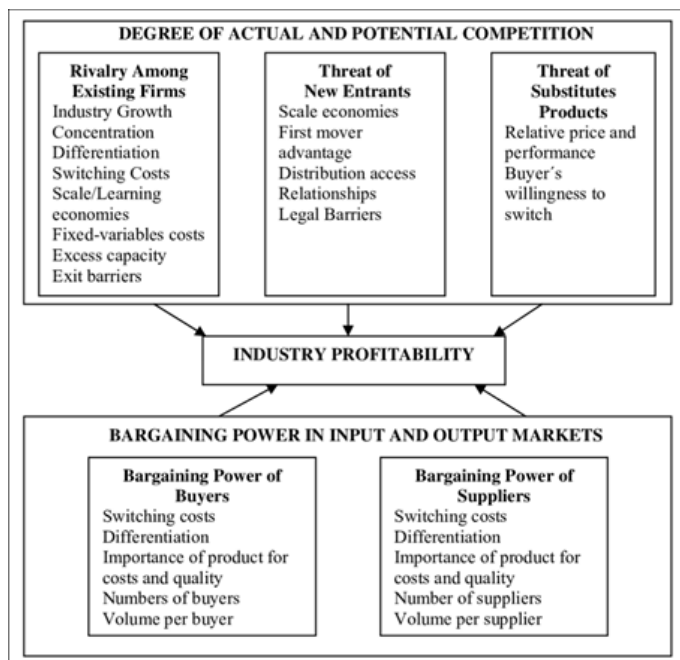
- Tied to politics as laws are passed by politicians
- Typically considers the impacts of copyright, anti-discrimination, antitrust, property rights, consumer protection and patents as examples

Industry Analysis

A firm's analysis is heavily influenced by the industry it belongs to.

Industry Objectives:

1. To understand the sensitivity of the industry to key macroeconomic factors (GDP, interest rates and oil prices)
2. To understand how the industry operates and the key performance metrics for evaluating these operations (regulations, barriers to entry/exit, industry concentration, profitability)
3. To understand the competitive structure of the industry (Porter's 5 Forces)



Sensitivity to Macroeconomic Factors

Sector	GDP	Interest Rate	Oil Price
Energy	++	-	++
Materials	++	--	--
Industrials	++	--	--
Consumer Discretionary	++	--	-
Consumer Staples	+	-	-
Health Care	+	-	-
Financials	+	--	-
Information Technology	++	--	-
Telecommunication	+	--	-
Utilities	+	-	--

Porter's Five Forces: a holistic way of looking at any industry and understanding the structural underlying drivers of profitability and income

1. Rivalry Amongst Existing Firms

- Higher degrees of competition among firms:
 - Push prices towards the marginal cost of production
 - Make non-price dimensions of products/services more important
- Determinants of the intensity of competition among firms:
 - Industry growth rate
 - Concentration and balance of competitors
 - Degree of differentiation in products/services and switching costs
 - Scale/learning economies and ratio of fixed to variable costs
 - Excess capacity and exit barrier

2. Threat of New Entrants

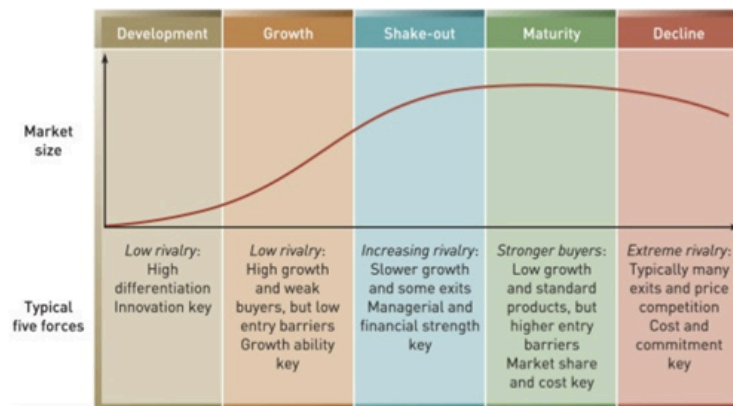
- Ease in which a new firm can enter an industry and will affect profitability of other firms within the industry
- Factors affecting barriers to entry are:
 - Economies of scale
 - First mover advantage
 - Relationship w/ suppliers and customers
 - Legal barriers

3. Threat of Substitute Products

- Alternative products/services meet same basic need
- Affects industry's bargaining power with suppliers/customers and ultimately profitability

- Degree to which substitutes exist depends on relative price and performance of competing products/services, and willingness for customers to accept substitutes
- 4. Bargaining Power of Buyers
 - Consumers want to pay less and get more
 - Bargaining power of buyer may lead to downwards pressure on price
 - Factors affecting bargaining power:
 - Buyer price sensitivity to product/service
 - Relative bargaining power of buyer
- 5. Bargaining Power of Suppliers
 - Suppliers want to get paid more and deliver less
 - Suppliers have bargaining power when there are less subs or fewer suppliers relative to # of customer's demand for product/service

Industry Life Cycle



Important to identify where a given industry lies within the industry life cycle

Example: Shopping industry is highly competitive and would be classified as maturity or decline

Example: Cannabis industry has gone thru quick development and would be classified as shake-out or maturity

Firm/Business Analysis

Strategies for creating a competitive advantage

- **Cost Leadership:** Supply same product or service at a lower cost
 - Economies of scale and scope
 - Efficient production
 - Simpler Product design
 - Lower input costs
 - Low-cost distribution
 - Little R&D or brand advertising
 - Tight cost control system
- **Differentiation:** Supply a unique product or service at a cost lower than the price premium customers will pay.
 - Superior product quality

- Superior product variety
- Superior customer service
- More flexible delivery
- Investment in brand image
- Investment in R&D
- Control system focus on creativity and innovation
- To achieve and sustain a competitive advantage:
 - There should be a match between firm's core competencies and key success factors to execute strategy
 - There should be a match between the firm's value chain and activities required to execute strategy
 - Evaluate resources and capabilities to implement strategies
 - Evaluate whether the firm's activities, infrastructure, and other operating elements are consistent with its competitive strategy
 - For companies with multiple business segments, how are these segments managed within the corporate governance structure? Analyze
 - Transaction Costs
 - Benefits of operating under one corporate umbrella

Key Questions:

Products	● Types of products, consumer demand, price elasticity ● Are there substitutes for the product? Is it differentiated? (Consider price and quality)
Industry Competition	● State of economy and state of industry ● Concentration in the industry (the number of firms and their sizes) ● Porter's five forces ● Relationships and alliances with other firms. ● Geographic location --> opportunities and threats/risks from abroad
Technology	● Production and Marketing processes ● What are the distribution channels? ● Cost Structure
Knowledge Base	● R&D programs ● Firm's grasp of the direction and pace of technology change ● Innovation (with regards to product development and production technology)
Management	● Entrepreneurial or not? ● Ethical/Social responsibility charter that the firm operates under ● Strength of corporate governance mechanisms ● Personal interest vs. shareholders' interest

Week 3: Understanding Firm and Industry Practice Questions

1. What does GDP measure?
 - a. Market value of goods and services produced by a company
 - b. Total amount of money in circulation within a country
 - c. Market value of goods and services produced by a country
 - d. None of the Above
2. In what stage of the industry life cycle will a company start to make profit?
 - a. Maturity
 - b. Shake-Out
 - c. Decline
 - d. Growth
3. The order of the top down approach is:
 - a. Global economy → company analysis → industry performance → domestic economies
 - b. Global economy → domestic economies → industry performance → company analysis
 - c. Global economy → industry performance → domestic economies → company analysis
 - d. Global economy → domestic economies → company analysis → industry performance
4. Which of these is not a primary objective of an industry analysis?
 - a. Understand the sensitivity of the industry to key macro-environment factors
 - b. Understand the role of government policies and regulations in the industry
 - c. Understand the competitive structure of the industry
 - d. Understand the supply and demand trends
5. The threat of new entrants in the airline industry is low?
 - a. True
 - b. False

Week 4: Comparative Analysis

"Law of One Price"

- Using comparables to value an equity security
- Identical assets will have the same price regardless of where they are traded
 - E.g. gold traded in the US market will be the same price in the UK market

Creating a list of Good Comparables (assumptions):

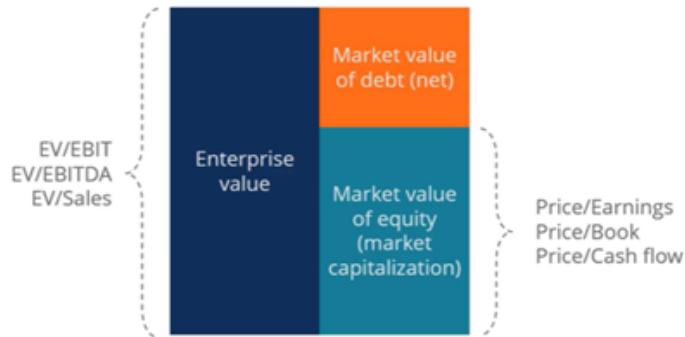
- No fundamental differences (same industry, same supply chain, same customers.)
- Similar growth prospects
- Same cost of capital (discount rate)
- Peers are valued accurately

Any distinctions/differentiations between assumptions will hurt the comparable set

- Less reliable and less accurate
- Example: Though Apple and Nokia operate in the same industry, they have significantly different growth prospects, and costs of capital
- **It is near-impossible to have a perfect comparable set in the real world**
- Global Industry Identification Standard (GICS): stock classification system
- 4 levels (highest to lowest level): Sector → Industry Groups → Industry → Sub-Industry
- NOTE: Comparable companies for valuations are typically found within the same sub-industry

Multiples

- Price Multiples: Valuation Metric using the Price of the stock
 - Price to Earnings (Price per share/Earnings)
 - Positives, price and earnings are strongly correlated, earnings is a good predictor of price. Negatives, earnings are not always positive, easily manipulated.
 - Price to Book (Price per share/Book value of equity)
 - Positives, Book value is always positive, generally stable. Negatives, does not accurately capture value of intangible assets.
 - Price to Sales (Price per share/Sales)
 - Positives, sales is always a positive number, difficult to manipulate.
 - Price to Cash Flow (Price per share/Cash flow)
- Enterprise Multiples: Valuation metric using the Enterprise Value (EV) of a firm
 - EV/EBITDA, EV/Revenue:
 - EBITDA: rough estimate of cash flow
 - EV/EBITDA is more popular as it measures the efficiency of a firm
- Drawbacks of Enterprise Multiples:
 - Exaggerates cash flow when working capital is growing



Performing a Comparable Companies Analysis

1. Build the comparable set
 - a. At least 4-8 firms (depends on the quality of comparables in industry)
2. Decide on Valuations Metrics
 - a. Choose between 2 - 4 measures
 - b. Metrics should be used based on importance to industry
 - c. **Metrics must be able to relate to Stock Price/Enterprise Value**
 - d. Calculate high, low, median, mean and quartiles

Example for Steps 1-2:

Company Name	Market Data			Financial Data				Valuation			
	Price (\$/share)	Market Cap (\$M)	TEV (\$M)	Sales (\$M)	EBITDA (\$M)	EBIT (\$M)	Earnings (\$M)	EV/Sales x	EV/EBITDA x	EV/EBIT x	P/E x
The Coca-Cola Company	38.14	168,041	185,122	46,854	13,104	11,127	7,381	4.0x	14.1x	16.6x	22.8x
Pepsico, Inc.	81.37	123,883	143,824	66,415	12,344	9,878	5,618	2.2x	11.7x	14.6x	22.1x
Dr Pepper Snapple Group, Inc.	52.31	10,326	12,764	5,997	1,319	1,103	620	2.1x	9.7x	11.6x	16.7x
Monster Beverage Corporation	69.62	11,618	11,004	2,246	606	584	357	4.9x	18.1x	18.9x	32.5x
National Beverage Corp.	20.81	964	968	645	78	66	41	1.5x	12.5x	14.6x	23.5x
Average								2.9x	13.2x	15.3x	23.5x
Median								2.2x	12.5x	14.6x	22.8x

[Source](#)

3. (For Enterprise Value) Calculate Equity Value
 - a. Equity Value = Enterprise Value - Debt + Cash
 - b. Calculate high, low, median, and mean
4. Calculate Implied Share Price
 - a. Implied Share Price = Equity Value/Shares outstanding
 - b. Calculate high, low, median, and mean

Week 4: Comparative Analysis Practice Questions

1. What is not part of creating a good peer group?
 - a. No fundamental differences
 - b. Similar growth prospects
 - c. Same cost of capital
 - d. None of the above
2. The DCF approach is not sensitive to assumptions made during forecasting.
 - a. True
 - b. False
3. EV is calculated by _____.
 - a. Market value of Equity + Debt + Cash
 - b. Market value of Equity - Debt + Cash
 - c. Market value of Equity + Debt - Cash
 - d. Market value of Equity - Debt - Cash
4. Enterprise Value is a measure of _____.
 - a. A company's total value
 - b. Earnings before interest, taxes, depreciation and amortization
 - c. A company's operating performance
 - d. A company's cash flow
5. Calculate the Enterprise Value given the following information: Market Value of equity: 17,000, Book value of equity: 6000, Market value of debt: 3500, Book value of debt: 2500, Cash: 11000, Total assets: 23,000
 - a. 24500
 - b. 9500
 - c. 2500
 - d. 11500

Week 5: Dividend Discount Model

Valuing Common Stock Using a Multiperiod (DDM) Dividend Discount Model

- The DDM is a basic tool in valuing common stock
 - Based on the idea that the value of an investment is the PV of future cash flows
- In the DDM, dividends are the relevant cash flows
 - Rationale is that they are the cash flows equity investors will receive in the future
- Arguments for using DDM is that sooner or later, all firms will pay dividends and reinvestment into the firm will increase future dividends
- The choice of the discounted cash flow model for valuation should be based on the subject firm's characteristics and the valuation perspective

DDMs are Most Appropriate When

- The firm has a history of dividend payments
 - Provides an analyst with a history from which to extrapolate future dividends
 - Otherwise, it's difficult to forecast when a non-dividend-paying firm will start paying dividends and how much they will eventually be
- The firm's dividends have a consistent relationship with the firm's earnings
- The valuation's perspective is that of a non controlling shareholder
 - If the perspective is that of a controlling shareholder where firm cash flows can be controlled, a free cash flow model would be more appropriate
- DDMs are usually most applicable to mature, profitable firms with a history of stable dividend payments

$V_0 = \sum_{t=1}^n \frac{D_t}{(1+r)^t} + \frac{P_n}{(1+r)^n}$	V_0 = Value of stock at time zero D_t = Discounted stream of future dividends P = Expected price of the stock n = Time period in which its sold (formula assumes stock will be held for n periods) r = Required return on common equity (discount rate)
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Valuing Common Stock Using the Gordon Growth Model

$V_0 = \frac{D_0(1+g)}{r-g} = \frac{D_1}{r-g}$	V_0 = Value of stock at time zero D_1 = The dividend next period r = Required return on common equity g = Constant growth rate for dividends
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Assumptions:

- r (required return on common equity) > g (growth rate in dividends)
- g is constant

Preferred Stock

- Often issued by financial institutions to raise capital
 - Usually pays a fixed dividend
- Can be callable and sometimes has an infinite maturity (maturity in perpetuity)
 - Can use the Gordon Growth Model to value it, but with the $g = 0$
- Since $g = 0$ (dividend is constant), we can divide by only the required return
 - The required return is often referred to as the capitalization rate
 - ie. It capitalizes the dividend
- Preferred stock has a claim on the firm's assets that is senior to that of common stock
 - Should be valued using a lower required return as it is considered less risky

Investment Attractiveness

- Besides growth, another way to evaluate the investment attractiveness of stock is to back out the growth rate the market is expecting for the firm's dividends
 - An analyst would then assess whether this growth rate is reasonable
 - If an analyst thinks the firm can increase dividend growth beyond the calculated amount, they would be favourably inclined towards the stock as an investment

Strengths and Weaknesses of Using the Gordon Growth Model

Strengths of Using the Gordon Growth Model	Limitations of Using the Gordon Growth Model
• Simple to understand, applicable to stable, mature firms that have constant growth in dividends	• Cannot be reliably applied to non-dividends-paying firms ◦ Dividends should also have a consistent relationship with the firm's earnings
• Can be applied to entire markets by using the data for the entire stock market	• Model assumes that the g is constant; cannot be applied to firms with several different future growth rates in dividends
• g can be estimated using $g = \text{nominal GDP growth}$ ◦ Sum of real GDP growth and long-term inflation ◦ Note: estimated long-term dividend growth rates should not be much higher than the GDP growth rate ■ Firm's growth can't greatly exceed the economy's over long term	• The estimated stock value is very sensitive to the $r-g$ denominator ◦ For this reason, analysts should perform sensitivity analysis, where the stock is valued under different required returns and growth rates

• Can be applied to firms that both pay dividends and repurchase stock ○ Only if an analyst forecasts per share dividends reflecting # of shares repurchased over time ○ Note: Firms don't commit to repurchase policies the way they do dividend policies; forecasting repurchases is thus difficult	• Most firms have non-constant growth in future dividends, so this model can't be directly applied ○ For these firms, need to use multistage models
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Forecasting

Using a Simple Example with Revenues:

Year 1	Year 2	Year 3	Year 4	Year 5	Forecast
1,200	1,300	1,400	1,600	1,700	?
	8.3%	7.7%	14.3%	6.3%	

- Arithmetic Average
 - Find the average of the annual percentage change in the historical revenues
 - ie. In this case, the annual % change in historical revenues is 9.14%
 - Then, multiply the annual % change by the previous period's revenue
 - ie. $1.0914 \times 1700 = \$1855$

Historical Numbers

- Issues with using historical numbers relate to the starting point and its impact on calculating an average
- Generally, if the data is available, go far enough back to cover an economic cycle
 - ie. usually 10 years

Management Guidance

- A source that an analyst may use is information from the company's management
 - Referred to as management guidance
- Theory is no one knows the company better than management
- Difficult for management to eliminate all bias in their guidance

Quantitative: historical data from time-series or correlation information



Naive Approach: looking at what happened in the previous period and predicting that it will happen again e.g. sold 100 widgets last period, sell 100 widgets this period

Moving Averages: taking the average of the last 3, 6, 12 periods, the next period will be the same

Exponential Smoothing: weighted average approach when looking at moving averages; weighting different periods differently because they are more relevant to the forecast

Week 5: Dividend Discount Model Practice Questions

1. Which of the following criteria is a sign DDM should not be used?
 - a. The company has a history of dividend payments
 - b. The company is in a mature state
 - c. The company is in a growth state
 - d. The dividends are closely related to revenue growth
2. Which of the following is not a limitation of Gordon's Growth model?
 - a. Cannot be reliably applied to non-dividends-paying firms
 - b. Can't be applied to firms with several different future growth rates in dividends
 - c. Most firms have non-constant growth in future dividends
 - d. G can be estimated using $g = \text{nominal GDP growth}$
3. When forecasting a company's balance sheet using the average of historical data; what is the denominator for the vertical analysis?
 - a. Revenue
 - b. COGS
 - c. Total Assets
 - d. Total Debt
4. Having a weighted growth rate based on previous years best describes which forecasting method?
 - a. Weighted average projections
 - b. Naive approach
 - c. Moving average
 - d. Exponential smoothing
5. When deciding on guidance projections for forecasting which source is most preferred?
 - a. Management
 - b. Competitors
 - c. The Morningstar reports
 - d. Yahoo Finance projections
6. This year, Company ABC paid an annual dividend of \$1.50 and has an annual dividend growth rate of 5%. If the discount rate is 7%, what is the current share price?
 - a. 24.25
 - b. 75
 - c. 22.50
 - d. 78.75

Week 6: Forecasting and Model Assumptions

Forecasting: the process of estimating future financial performance based on historical data, industry trends, and management expectations

Accurate forecasting has potential financial rewards and will aid in the identification of the critical drivers of success for a business even though it's a difficult process

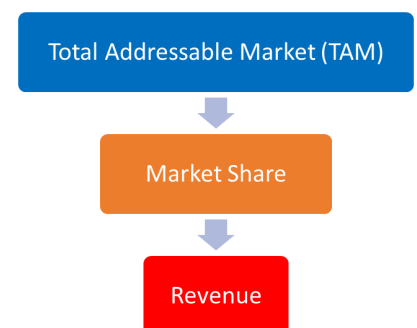
- Connection between the sources and uses of cash will be clearer, allowing management to focus resources where required
- Enhances forced collaboration and communication amongst various groups within an organization
- Important for items of interest → revenue, expenses, earnings, cash flow, capital requirements, cost of capital, capital expenditures and stock price
 - Usually use income statement, but also balance sheet and cash flows
- Timeframe is related to reporting periods, typically quarterly and annually

Quantitative Forecasting

- Based on statistical models using historical data to generate numeric predictions
 - Advantage: tangible and easy to visualize
 - Disadvantage: the past is rarely an accurate predictor of the future due to new product launches, replacement of key management, major shifts in strategy, life stage of the industry, and technological innovation change
- Useful when there is a long time series of data available and the company being valued and its industry are reasonably stable

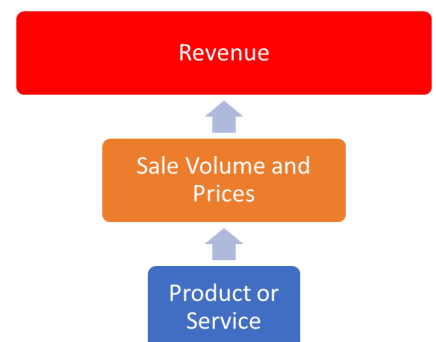
Top Down Forecasting

- Uses macro-environment factors to predict company financials based on the company's market share
 - Advantage: easy access to macroeconomic data
 - Disadvantage: doesn't consider the process by which market share is captured
- Useful for large established firms in reasonably mature industries



Bottom Up Forecasting

- Uses company-level data to generate the forecast
- If a company sells one single product:
 - The analyst will forecast the volume of sales and the sale price for a given product to derive the revenue forecast



- If the company operates in different geographic regions the potential exists for individual forecasts for each region

Hybrid Forecasting

- The analyst combines both methodologies (top down/bottom up) to derive a forecast, which is usually more thorough

Forecasting Approaches

Approach	Description
Naïve	● Based on the projected revenue growth of the previous year ○ Advantage: simple ○ Disadvantage: it's not accurate unless the most recent past is most representative of the future (rare)
Moving average	● Revenue growth will be the average over a number of recent years (3-5 years) ○ Advantage: smoothes growth over a # of years ○ Disadvantage: more accurate only if factors influencing growth tend to be longer lived and transition slowly over several years, such as the economic cycle
Exponential smoothing	● Similar to moving average, but when average is calculated, the different years are weighted differently ○ Useful if the most recent year is seen as the most predictive of the future, however, the smoothing effect of the moving average is still desired ○ Disadvantage: not obvious how to weigh historical data
Trend Analysis	● Assumes data will follow a predictable trend observed
Regression Analysis	● Based on idea that some internal and external factors can impact revenue ● Compares two variables (ex. GDP and revenue) ○ Aim for absolute error to be as small as possible ○ % difference = intercept + slope x % change in GDP

- Within-sample validation: determines which model is most accurate
 - Calculation: use average, median, and standard deviation of the % difference between forecasted value and the actual value in each year
 - Lowest values of all three is the best approach quantitatively

Qualitative Forecasting

- Predictions based on experts' opinions and views

- Useful with start-ups or new product segments since little representative, historical data is available
 - Advantage: forward looking and can be adjusted specifically to the context of the firm and the industry
 - Disadvantage: driven by the opinion of experts with incomplete information and inherent biases that are not observable

Approach	Description
Executive Opinion	• Firm's management comments ◦ Small and optimistic, so more info is needed to form decision
Delphi Method	• Multiple rounds of gathering opinions ◦ Near-consensus from a panel of experts ◦ Mitigates the potential for one group member to dominate and potentially overly influence the outcome
Surveys	• Info collected through consumers' direct or retailer surveys done externally or by an analyst's firm

Week 7: DCF Analysis

Discounted Cash Flows Model Overview

- Discounting projected future cash flows back to the present using a discount rate that reflects capital risk .
 - The company's intrinsic value is then the sum of these discounted cash flows
 - Analysts then compare the DCF Model to the market value to determine if a company is overvalued (sell), undervalued (buy), or valued correctly (hold)
- **Unlevered DCF:** before interest payments and debt paydowns, not incorporating capital structure, dealing with EBIT for example

Steps to Perform a DCF

Step 1: Assumptions

- Forecast 5-10 years in the future as it tends to be more representative and stable
- Determine the growth rate of revenue from previous years - you'll likely be given this
 - To calculate the amounts needed for EBITDA, calculate Cost of Goods Sold, Selling Expenses, and General/Admin Expenses as a function of revenue through historical average percentages of revenue and multiplying that amount by revenue
- Year 1 Forecasted Revenue = $(1 + g_1) * \text{Revenue of the previous year}$

Step 2: Net Income

- Calculate the Operating Income (EBIT) for the forecasted periods using the % of revenue for main cost items [COGS, SG&A, Depreciation Expense]
- Subtract the Income Taxes Expense through $\text{EBIT} * (1 - \text{Tax Rate})$ to get **unlevered net income**

Step 3: **Unlevered Free Cash Flow (FCF)** Build Up

- Unlevered Net Income
 - Add: Depreciation and Amortization
 - Less: Changes in Net Working Capital [non-cash, current assets/current liabilities changes]
 - Less: Capital Expenditures [investments in buildings, equipment, etc]

Net Working Capital (NWC)

- It is the difference between a company's current assets and current liabilities
- It measures the company's liquidity and ability to fund short-term business operations
- There are a few methods to calculate the NWC, depending on what you (analyst) wants to include/exclude
 - $\text{NWC} = \text{Current Assets} - \text{Current liabilities}$
 - $\text{NWC} = \text{Current Assets (less cash)} - \text{Current Liabilities (less debt)}$
 - $\text{NWC} = \text{A/R} + \text{Inventory} - \text{A/P}$
- An increase in NWC is a use of Cash

- Increase in A/R
- Decrease in A/P
- A decrease in NWC is a source of Cash
 - Decrease in A/R
 - Increase in A/P

Capital Expenditure and Depreciation

- A growing company will have CapEx > Recognized depreciation on an annual basis
- Over time (when the company reaches maturity), CapEx and depreciation will converge
- The analyst must ensure that CapEx and Depreciation converges prior to modeling the Terminal Value
- In the lecture example, Capital expenditure is calculated based off of the assumption that it can reasonably be estimated as a % of revenue

*Note: The WACC(Weighted Average Cost of Capital) will be provided. You do not have to calculate it

Step 4: Terminal Value

- Terminal Value: is the value of a business or project beyond the forecast period.
- 2 methods to calculate
 - Growing Perpetuity : assumes that a business will continue to generate cash flows at a constant rate forever

$$V_{Terminal\ Value} = \left(\frac{1 + g_{FCF}}{r_{wacc} - g_{FCF}} \right) \times FCF_{Last\ Year}$$
 - Terminal/Exit Multiple
 - EBITDA * average of multiples from previous years

Step 5: Enterprise Value to Equity Value

- Growing Perpetuity
 - Enterprise Value = Market Value of Equity + Debt - Cash
 - Using the PV Formula

$$V_0 = \frac{CF_1}{1+r} + \frac{CF_2}{(1+r)^2} \dots \frac{CF_{Final\ Year} + V_{Terminal\ Value}}{(1+r)^{Final\ Year}}$$
 - Calculate Price per Share to the Firm (**P**)

$$P_0 = \frac{V_0 + Cash_0 - Debt_0}{Shares\ Outstanding_0}$$

Step 6: Sensitivity Analysis

- Studies how the target variable is affected by input variable(s)
 - Examples of input variables include number of shares outstanding, debt-to-equity ratios and company earnings
- E.g. Change growth rate, WACC, number of years, % used in FCF, etc.

Week 7: DCF Analysis Practice Questions

1. Which of the following formulas is correct when calculating Free Cash Flow?
 - a. Unlevered Net Income + Depreciation - Capital Expenditures - Changes in Net Working Capital
 - b. EBIT x (1 - Tax Rate) + Depreciation - Capital Expenditures - Changes in Net Working Capital
 - c. Accounts Receivable + Inventory – Accounts Payable
 - d. Both A and B

2. Which of the following statements best describes Terminal Value?
 - a. The value of a business or project beyond the end of the forecasted period
 - b. The difference between a company's current assets and current liabilities
 - c. The value of a business if it were to hypothetically go out of business
 - d. None of the Above

3. What is Sensitivity Analysis?
 - a. A form of analysis conducted to assess whether EBITDA is accurate
 - b. A form of analysis conducted to assess the statistical validity of the model
 - c. A form of analysis conducted where inputs are linked to the DCF, allowing analysts to see the impact of changes to inputs on the DCF when adjustments are made
 - d. A form of analysis conducted to assess whether the company will run forever

4. Which of the following formulas should be used when calculating Terminal Value?
 - a.
$$V_{Terminal\ Value} = \left(\frac{1 + g_{FCF}}{r_{wacc} - g_{FCF}} \right) \times FCF_{Last\ Year}$$
 - b.
$$P_0 = \frac{V_0 + Cash_0 - Debt_0}{Shares\ Outstanding_0}$$
 - c.
$$V_0 = \frac{CF_1}{1+r} + \frac{CF_2}{(1+r)^2} \dots \frac{CF_{Final\ Year} + V_{Terminal\ Value}}{(1+r)^{Final\ Year}}$$

5. Which of the statements best describes the relationship that should be seen between capex and depreciation at the end of the forecast?
 - a. They should converge and be roughly equal in value
 - b. Capex should be significantly greater than depreciation
 - c. Depreciation should be significantly greater than Capex
 - d. None of the Above

Answer Key

Week 1: Time Value of Money

1. C 2. Discount 3. Growing Perpetuity 4. B (must multiply by compounded interest) 5. B

Week 2: Bond Valuation

1. C 2. B 3. D 4. A 5. D 5. B

Week 3: Understanding Firm and Industry

1. C 2. D 3. B 4. B 5. A

Week 4: Comparative Analysis

1. D 2 B. 3. C 4. A 5. B

Week 5: Discount Dividend Model

1. C 2. D 3. A 4. D 5. A 6. D

Week 7: DCF Analysis

1. D 2. A 3. C 4. A 5. A