Introduction to Business Finance

Business Finance | Module 1

Learnings from the course

- Information useful for starting your own firm
  - Valuing projects
  - Concepts important in fund raising
  - Capital budgeting
- Information pertinent to being a savvy investor
  - Different financial instruments
  - Valuing investments
  - Risks inherent to investing
- Information pertinent to understanding the world around you
  - Determining how the company you work for is performing
  - Deciphering newspaper articles

Important concepts

The following slides contain some concepts that are central to grasping and applying the fundamentals of business finance.

Capital structures and financial claims

- Corporations are funded by a split between debt and equity, the breakdown of this split is called a corporation's 'capital structure'.
- The table below shows the fundamental differences between debt and equity. It shows:
  - How cashflows are carved up.
  - How to split control of assets.

Debt	Equity
• Scheduled repayment	• No repayment schedule
• Senior claimants after default	• Lowest claimant after default
• Control rights *after* default	• Control rights *until* default

The present value of future cash

- Cash expected in the future isn't worth the same as it is today.

- The present value of future cash can depend on some of the following factors:
  - Delayed consumption.
  - Changes in supply and demand.
  - Inflation (loss of purchasing power of the currency).
  - Economy-wide (systematic) and firm-specific (idiosyncratic) risks.

Compounding

“Compound interest is the eighth wonder of the world. He who understands it, earns it ... he who doesn't ... pays it.”

- Albert Einstein

Compounding is essentially the addition of interest to a principal sum and accrued interest on that principal sum.

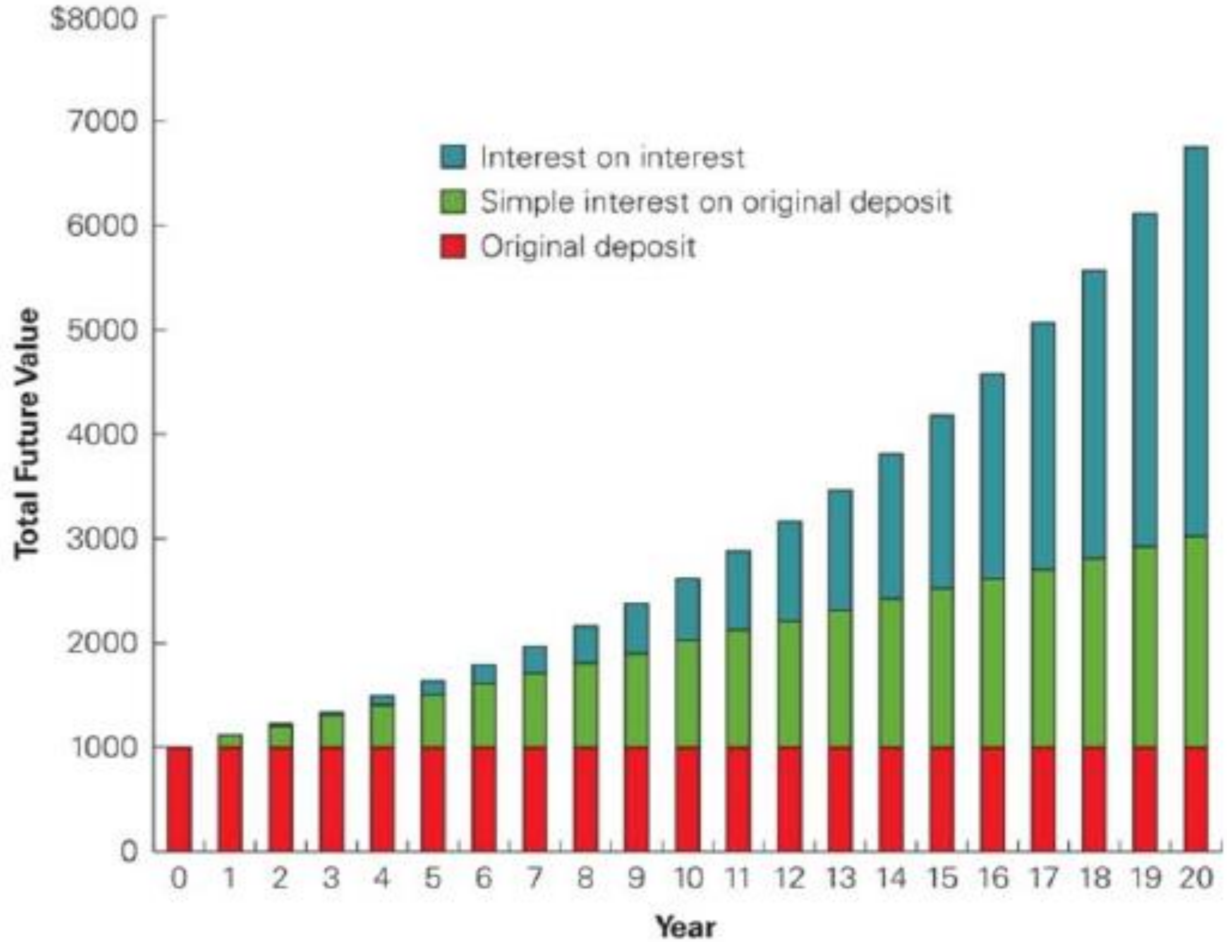
A simple compounding example

- Suppose you make a deposit of $1000 with an annual compound interest rate of 9%. You decide not to touch the deposit for 20 years, what happens?

- With compounding, you won't just get back $1000 + ($\frac{9}{100}$ x $1,000 x 20) = $2,800. That is your return with simple interest
- You actually get $1,000 + ($1.09^{20}$ x $1,000) = $6,604 because of interest on interest due to compounding. The chart on the next page shows how the money grows over time.

- It is important to note that the $6,604 is money in the future which is actually worth less today.

A simple compounding example: Graph



Compounding frequency

- Compounding can occur more than once a year (e.g. biannually, quarterly, monthly). The number of times a sum is compounded in a year is called the frequency.

- The total expected after a year of equal instalments is:

$$\text{FCF} = \text{CF x } (1 + \frac{r}{f})^{f}$$

  - r is the rate
  - CF is cashflow
  - FCF is future cashflow
  - F is the frequency

Another compounding example

- You loan \$10,000 from a friend with a compound interest rate of 10% compounded bi-annually. How much will you pay at the end of the year?

- \$10,000 x $(1 + \frac{0.1}{2})^2$ = \$10.000 x $(1 + 0.05)^2$ = \$11,025

Discounting

- Discounting is adjusting a future cashflow to its perceived value today.

- For example: A friend promised you $1,000 in a year, if you require a 5% return on any investments you make or loans you give. What is the promise worth today?
- $\frac{1}{1.05}$ x $100 = $95.24

Discount factors

- The present value of an expected future cashflow (CF) with a required return of r% in t years is:
- $(\frac{1}{1+r})^t$ x CF

- r is also referred to as the ‘discount rate’
- $(\frac{1}{1+r})^t$ is referred to as the t-year discount factor

Valuing cashflows with discount factors

Year t	$CF	r (= discount rate)	DF (= discount factor)	$PV = CF x DF
1	100	r_1=0.05	$\left(\frac{1}{1.05}\right)$ = 0.9524	95.24
2	100	r_2=0.06	$\left(\frac{1}{1.06}\right)^2$ = 0.8900	89.00
3	100	r_3=0.07	$\left(\frac{1}{1.07}\right)^3$ = 0.8163	81.63
Sum				265.87

- From the table above we can see the present value of the three cashflows and the sum of those cash flows. We can also clearly see that $300 over the next 3 years is worth only $265.87 today.
- In a competitive market you would have to pay $265.87 for the cashflows. That is called no-arbitrage.
- No-arbitrage means price is equal to value.

Bonds

- A bond is a mechanism for borrowing. It gives an investor a fixed income in a defined period of time.
- For example: A bond promises a 'risk-free' payment of \$1,000 in one year. If the risk-free interest rate is 5%, what would be the price of the bond in a normal market?
  - The price is the present value of \$1,000 discounted for one year.
  - PV = \$1,000 x $\left(\frac{1}{1.05}\right)$ = \$952.38
  - So, the price of the bond in a normal market would be \$952.38

How to identify arbitrage opportunities

- Arbitrage is the opportunity to make money because of a disparity between value and price.
- Suppose the price of the bond in the above example is $940 and you can borrow some money at the bank at the risk free rate. People will be able to do the following:

	Today ($)	In One Year ($)
Buy the bond	−940.00	+1000.00
Borrow from the bank	+952.38	−1000.00
Net cash flow	+12.38	0.00

- Arbitrage opportunities like these will force the price of the bond upwards until it is equal to $952.38

Perpetuity

- A perpetuity is a security without a fixed maturity date.
- It is a regular stream of equal payments that will go on forever.

- The formula for calculating the present value (PV) of a perpetuity is as follows:
  - PV = $\frac{CF}{r}$
- For example, the present value of an annual perpetuity of $1,000 at a discount rate of 7% is:
  - PV = $\frac{\$1{,}000}{0.07}$ = $14,285.71

Annuity

- An annuity is a regular stream of equal payments with a finite life.

- The formula for the present value (PV) of an annuity is as follows:
- PV = $\frac{CF}{r} - (\frac{1}{1+r})^{n} \times \frac{CF}{r}$
  - CF = cashflow
  - r = interest rate
  - n = number of payments

An annuity example

- You and your partner are considering getting a mortgage. You can afford to pay \$1,530 a month and the bank offers you a 25-year mortgage at an interest rate of 4.5% per year (compounded monthly). How much can you afford to borrow from the bank today?
- The formula for how much you can borrow (the PV of the annuity) is: PV = $\frac{CF}{r}$ - $(\frac{1}{1+r})^{n}$ x $\frac{CF}{r}$
    - CF = \$1,530 | r = $\frac{0.045}{12}$ = 0.00375 | n = 25 x 12 = 300

- $\frac{\$1,530}{0.00375}$ - $(\frac{1}{1.00375})^{300}$ x $\frac{\$1,530}{0.00375}$ = \$275,262.79
- You and your partner can afford to borrow \$275,262.79

Growing perpetuity

- A growing perpetuity is a endless stream of increasing regular payments.

- The formula for the present value (PV) of a growing perpetuity is:
- PV $= \frac{CF}{r - g}$
  - CF = cashflow
  - r = interest rate
  - g = growth rate

A growing perpetuity example

- You're considering buying shares of SteadyMoney Corporation stock. SteadyMoney currently pays a dividend of $1.2 a year and analysts expect a growth rate of 4.5%. If you require a return of 12.5% on stocks you invest in, what should you be willing to pay for SteadyMoney shares?
- We can answer this question by calculating the present value of the cashflows which are a growing perpetuity.

- CF = $1.2 | r = 0.125 | g = 0.045
- PV = $\frac{CF}{r-g} = \frac{\$1.2}{0.125-0.045} = \frac{\$1.2}{0.08}$ = $15
- You should be willing to pay $15 for the stock.

Real interest rates: Adjusting rates for inflation

- To get what is referred to as the nominal interest rate ($r_{nominal}$), rates need to be adjusted for inflation.
- Inflation is a loss is purchasing power. If in the future things are more expensive meaning the same amount of money you have today will get you less in the future, that is called inflation.
- The general formula for calculating the nominal interest rate is:
  - $(1 + r_{real})$ = $(1 + r_{inflation})$ x $(1 + r_{nominal})$
  - r_{real} = interest rate adjusted for inflation
  - $r_{inflation}$ = rate of inflation
  - $r_{nominal}$ = interest rate before adjustment for inflation

A real interest rate example

- You win $1 million in a lottery. You're going to invest it, retire and live on the returns, and you hypothesize that you need a return of $75,000 or a nominal rate of 7.5% to live comfortably. If inflation which is 3% what real rate of return do you require from your investment?
- $(1 + r_{real})$ = $(1 + r_{inflation})$ x $(1 + r_{nominal})$
- $(1 + r_{real})$ = (1 + 0.03) x (1 + 0.075)
- $(1 + r_{real})$ = 1.03 x 1.075 = 1.10725
- r_{real} = 0.10725 or 10.725%
- You would require a real interest rate of 10.725%