(2) shareholders incur costs to monitor the managers and constrain their actions.

Agency problems are mitigated by good systems of corporate governance.

- Legal and Regulatory Requirements:
  Australian Securities and Investments Commission (ASIC): to prevent corporate crime and to protect shareholders.
- Compensation plans that can give to manager:
  - Bonus (cash)
  - Stock option (one type of derivative): stock = fixed number of shares × share price
- Board of Directors: Shareholders has voting power to change at Annual General Meeting
- Monitoring
- Takeovers: through Mergers & Acquisition
- Shareholder pressure

4. Comparisons:

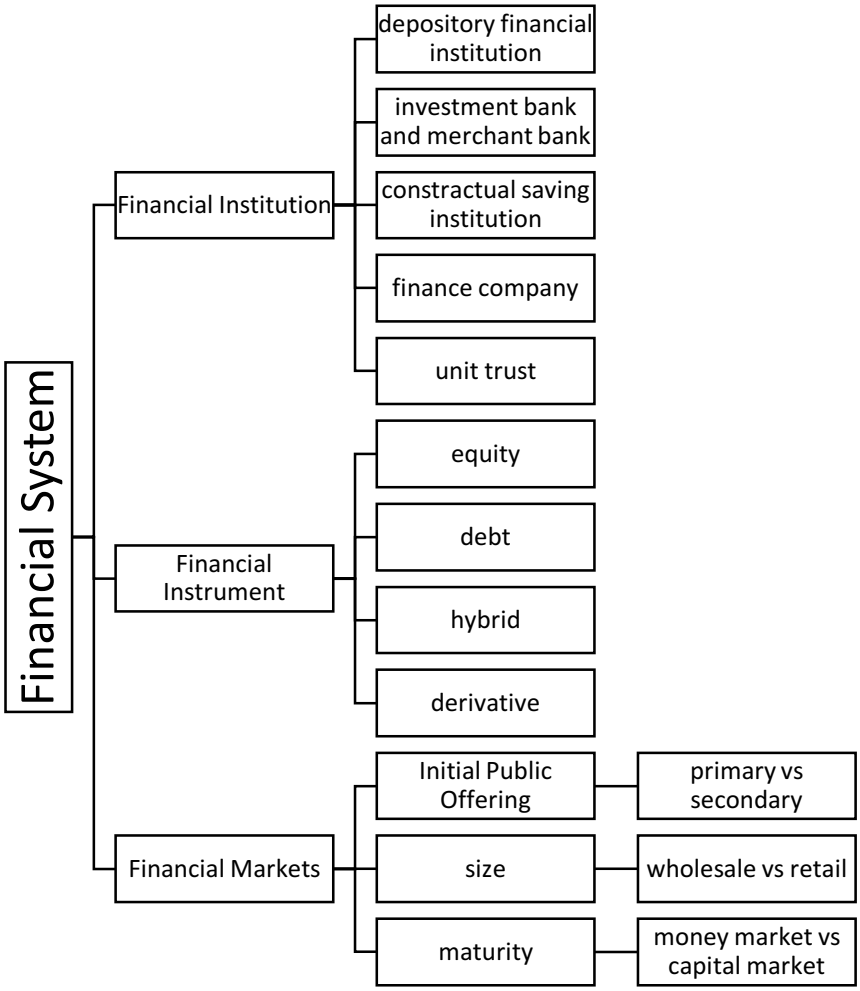
a) Capital budgeting and financing decisions.
Capital budgeting means investment in real assets.
Financing means raising the cash for this investment.

b) Closely held and public corporations.
The shares of public corporations are traded on stock exchanges and can be purchased by a wide range of investors.
The shares of closely held corporations are not publicly traded and are held by a small group of private investors.

c) Limited and unlimited liability.
Unlimited liability: Investors are responsible for all the firm's debts. A sole proprietor has unlimited liability.
Investors in corporations have limited liability. They can lose their investment, but no more.

d) Real Asset vs Financial Asset
Real assets: Assets (tangible & intangible) used to produce goods and services and generate cash flows/income.
Financial Assets/Securities: Financial claims (bond, company share) to the income generated by the firm's real assets.

Lecture 2 Modern Financial Systrem



1. Financial System

Financial system: A range of financial institutions, financial instruments and financial markets facilitating the flow of funds between lenders/savers (providers of funds) and borrowers (users of funds).

- Essential in facilitating economic growth and future productive capacity in a country.
- A modern, sound and efficient financial system encourages accumulation of savings that are then available for investment in productive capital within an economy.
- The provision of finance to business:
  economic growth $\rightarrow \uparrow$ productivity, $\uparrow$ employment & higher standard of living.

In economic system, not all economic agents have the same consumption/saving profiles. These are two broad categories.

Surplus units (Savers)	Deficit units (Borrowers)
• Providers of funds; lenders • Have funds in excess of their current desired level of consumption. • Wish to invest & transfer their purchasing power to the future. • Invest savings via purchase of financial instruments	• Users of funds • Have a shortage of funds today, but expect to have a surplus amount in the future. • Wish to borrow funds for consumption & capital investment expenditures today. • Borrow funds via sale/issuance of financial instruments.

Lecture 3 Basic Financial Mathematics and Valuation

1. **Time value of money**: The difference in value between money today and money in the future is due to the time value of money.
   a) **Present values (PV)**: express the value of cash flows in terms of dollars today
   Compounding is the process of moving cash flows forward in time.
   Discounting is the process of moving cash flows back in time (compute the PV of future cash flows).

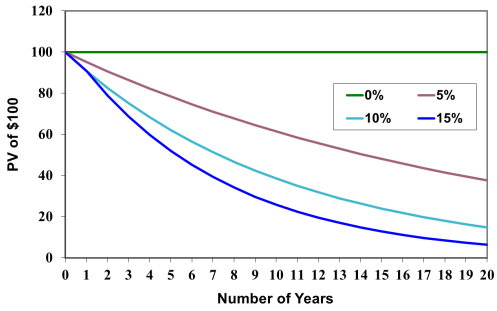
Discount Factor: Present value of a $1 future payment in one period.

$$DF_n = \frac{1}{(1+r_n)^n} < 1$$

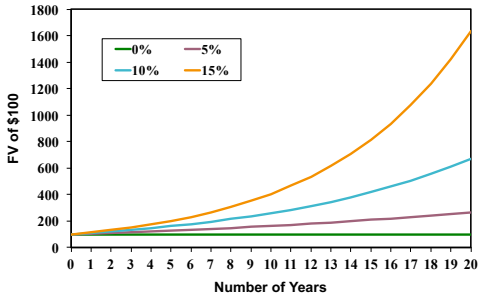
Present Value of future cash flow C1 is:

$$PV\ of\ C_1 = DF_1 \times C_1$$

Discount Rate: Interest rate used to compute present values of future cash flows.



   b) **Future values (FV)**: express the value of cash flows in terms of dollars in the future



2. **Interest**
   a) **Simple interest**

$$FV = PV(1+rt)$$

   b) **Compound interest**

$$FV = PV(1+r)^t = PV\left(1+\frac{r}{m}\right)^{m\times n}$$

   c) **Continuously compounding interest**: Continuous compounding is the theoretical case where interest is calculated at every single point in time. Another way of thinking about this is that the compounding period is infinitely small

$$FV = PVe^{rt}$$

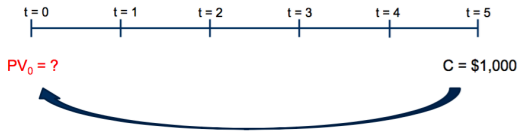
3. **Valuing cash flows**
   Net present value (NPV):

$$NPV = PV(Benifits) - PV(Cost)$$
$$NPV = PV(all\ project\ cash\ flows)$$

   - Net present value rule: Accept investments that have positive net present value

- Rate of return rule: Accept investments that offer rates of return in excess of their opportunity cost of capital

a) Single cash flow

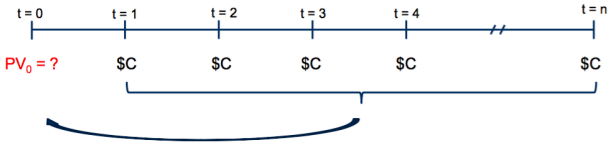


$$PV_0 = C_t \times DF_t = \frac{C_t}{(1+r_t)^t}$$

where C_n is the expected payoff at time period t in the year

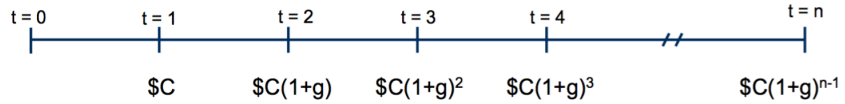
b) Multiple cash flows

i. Annuity: a stream of N <u>equal cash flows</u> paid at <u>regular intervals</u> with <u>fixed interest rate</u>.



$$PV = \sum \frac{C_t}{(1+r_t)^t} = C\left[\frac{1}{r_t} - \frac{1}{r_t(1+r_t)^t}\right] = \frac{C}{r}\left[1 - \frac{1}{(1+r_t)^t}\right]$$

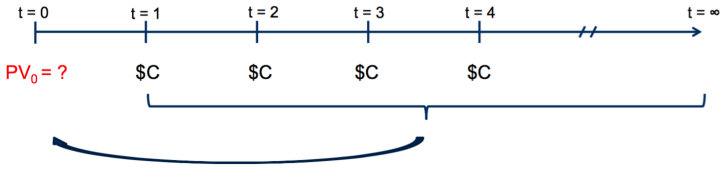
ii. Growing annuity: A growing annuity is a stream of N <u>constant growing cash flows</u>, paid at <u>regular intervals</u>.



$$PV_0 = \frac{C}{r-g} \times \left[1 - \left(\frac{1+g}{1+r}\right)^t\right]$$

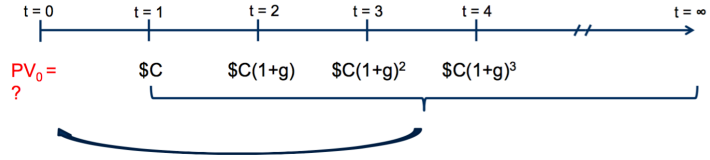
c) Infinite cash flows

i. Perpetuity: A stream of <u>equal cash flows</u> that deliver a <u>fixed payment</u> <u>periodically</u> forever.



$$PV = \frac{C}{1+r} + \frac{C}{(1+r)^2} + \frac{C}{(1+r)^3} + \cdots = \frac{C}{r}$$

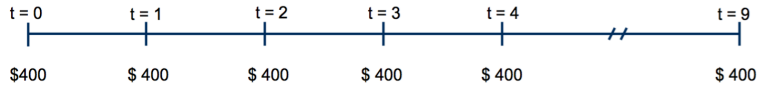
ii. Growing perpetuity: a stream of cash flows that occur at <u>regular intervals</u> and grow at a <u>constant rate</u> forever.



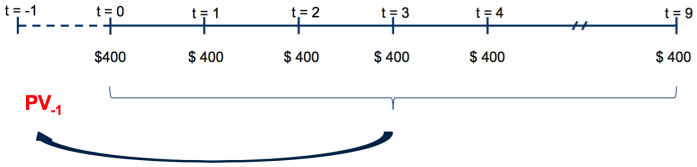
$$PV = \frac{C}{r-g}$$

4. Extended Examples

a) Annuity due: An annuity for which the cash flows occur at the beginning of the period. These cash flows are equivalent to a N period annuity with extra payment at t_0

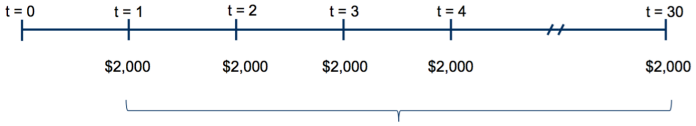


$$PV = C + \frac{C}{r}\left(1 - \frac{1}{(1+r)^{t-1}}\right)$$



$$PV = \frac{C}{r} \times \left(1 - \frac{1}{(1+r)^{t+1}}\right) \times (1+r)$$

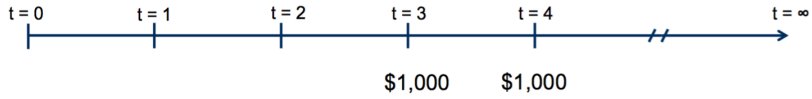
b) Future value of annuity



$$PV_0 = \frac{C}{r}\left[1 - \frac{1}{(1+r_t)^t}\right] = \frac{FV_n}{(1+r)^t}$$

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

c) Delayed perpetuity: A perpetuity that begins at a date in the future



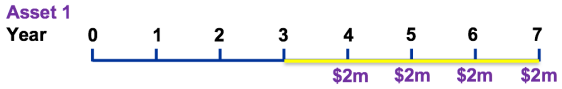
find future value of perpetuity at one year before starting year:

$$FV = \frac{C}{r}$$

find present value:

$$PV = \frac{FV}{(1+r)^t}$$

d) Deferred annuity: an ordinary annuity that does not begin in one period's time, but at a later date.



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

where x is the number of periods before the first payment

5. Interest rates: APR, effective and periodic rates

There are many possible compounding periods that can be used depending on the nature of the investments. The r used in your calculations must match the ***frequency*** of cash flows.

a) Annual Percentage Rate (APR): this is the nominal, or quoted interest rate, which is quoted by financial institutions.

b) Periodic rate: the interest rate per period

$$periodic\ rate = \frac{APR}{m}$$

c) Effective Rate: the rate of interest actually earned by the investor.

Summary

	Net present value	Internal rate of return	Payback	Profitability index
Formula	$NPV = \sum \frac{F_t}{(1+r)^t} - C_0$	$\sum \frac{F_t}{(1+IRR)^t} - C_0 = 0$	Time taken to recover initial cash outlay associated with the project	$PI = \frac{PV_{future\ cash\ flows}}{Investment}$
Decision rule	Accept: $NPV > 0$ Reject: $NPV < 0$	Accept: $IRR > E(return)$ Reject: $IRR < E(return)$ Borrowing decisions: Accept: $IRR < oppotunity\ cost$	Accept project with the shortest payback period (mutually exclusive) Accept project that meets the predetermined payback period, i.e. cut off period (non-mutually exclusive)	Accept: $PI > 1$ Reject: $PI < 1$
Strengths	• Clear decision rule that maximises shareholder's wealth [same as the corporate objective] (dominant method; always prevails) • Incorporates time value of money • Incorporates risk of the projects • The technique defines relevant cash flows • Considers all cash flows expected to be generated by a project, i.e. uses all available information • Correctly ranks projects on wealth maximising criterion. Can rank mutually exclusive projects (choose project with higher NPV) • The NPV of a project is not affected by "packaging" it with another project. NPV(A+B) = NPV(A) + NPV(B). [Value Additivity property]	• Provides a clear decision rule that targets a hurdle rate acceptable to shareholders • Is easily comparable to rates of return on other investments • Incorporates the time value of money • Incorporates the cost of the project as well as its cash flows • Management feel they can understand the concept • It is a simple way to communicate the value of a project to someone who doesn't know all the estimation details • Knowing a return is intuitively appealing • If the IRR is high enough, you may not need to estimate a required return, which is often a difficult task	• Simple to estimate • Easy to understand • Adjusts for uncertainty of later cash flows • Biased toward liquidity • Provides a clear decision rule – accept the project with shortest payback period • Ranks projects based on time taken to recover cost – therefore simple to interpret	• Clear decision rule that maximises shareholder's wealth • Incorporates time value of money • Incorporates risk of the project • The technique defines relevant cash flows • Considers all cash flows expected to be generated by a project, i.e., uses all available information • Allows for efficient allocation of funds when faced with capital rationing • Closely related to the NPV, generally leading to the same decision as NPV • Easy to understand and estimate • May be useful when available funds are limited
Weakness	• There is a difficulty in forecasting future cash flows • There are problems in estimating the appropriate discount rate • It is difficult for non-finance trained managers to fully understand what it means. • Ignores the value of real options: expansion, abandonment, change of use	• Calculation is mathematically problematic without a computer or financial calculator • Decision rule requires us to know whether it is a financing or investment project • If there are positive and negative cash flows, there may be multiple IRRs • Does not consider the scale of the project • Cannot rank mutually exclusive projects • Reinvestment assumption flawed	• An arbitrary cut-off period must be selected by management. • Ignores cash flows that occur after the cut-off period • Ignores time value of money (eliminated by the discounted payback) • Biased against long-term projects, such as research and development, and new projects • Can be inconsistent; the ranking of projects may be changed by packaging with other projects	• There is a difficulty in forecasting future cash flows • There are problems in estimating the appropriate discount rate • Essentially the same as NPVs • May lead to incorrect decisions in comparisons of mutually exclusive investment (as it does not consider the scale of the project)