ACCTG101 Revision
MODULES 10 & 11

TIME VALUE OF MONEY & CAPITAL INVESTMENT

MODULE 10

TIME VALUE OF MONEY

Time Value of Money is…

- the concept that **cash flows of dollar amounts have different values at different times** because of **compound interest**.

- the concept which means **money is worth more today than tomorrow** (because you can invest $1 today and get $1+interest tomorrow).

Calculating Future Value (compounding)

THIS IS THE COMPOUND INTEREST FORMULA FOR FINDING FUTURE VALUE

$$FV = P \times (1 + i)^n$$

Number of Periods

Future Value

Present Amount/
Initial Amount

Interest Rate

Calculating Present Value (discounting)

IT CAN ALSO BE REARRANGED DEPENDING ON WHAT YOU NEED TO FIND:

$$P = FV / (1 + i)^n$$

Number of Periods

Present Amount/ Initial Amount

Future Value

Interest Rate

The Discount Factor

* THIS IS THE SAME EQUATION AS THE PREVIOUS SLIDE – DON'T FREAK OUT *

$$P = FV \times \underbrace{1/(1 + i)^n}$$

This is the **discount factor**.

You can find the discount factor in **table A**
by $(\text{Table A Factor})_{n,r}$

Simple vs Compound Interest

- **Simple interest** is the SAME for all periods the investment is held.

  eg. $100 @ 5% p.a. simple interest = $5 a year

- **Compound interest** is DIFFERENT because the interest is calculated on initial amount + interest earned.

  eg. $100 @ 5$ p.a. compound interest

  = $5 in year 1, $5.25 in year 2, $5.51 in year 3

What is “r”?

- **“r”** is the **required rate of return** demanded by investors (providers of capital) to compensate for the **risk** of the investment.

- the **higher the risk, the higher the rate of return**.

Present Value: Single future amount

$$P = FV \times (\text{Table A factor})_{n,r}$$

- if only **one amount** is concerned, use **table A**.
- **table A's factors** can be summed into **table B's factors** if the conditions are met for an **annuity** (see next slide).

Present Value: Multiple future amount

$$P_{annuity} = FV \times (\text{Table B factor})_{n,r}$$

- if you receive the **same amount** at the **same r** over several **equally-spaced** periods, it is an **annuity**.

you can rearrange the formula to find whatever unknown you want

MODULE 11

CAPITAL INVESTMENT

Capital Investment Decisions

- A manager making a capital investment decision must:
  - estimate the **quantity and timing of cash flows**;
  - assess the **risk** of the investment;
  - consider the impact of the project on business **profits**.

Relevant Cash Flows

- an item is **relevant** when the effects of its cash flow is **incorporated into the analysis**.
- items such as **sunk costs** and **fixed overheads** are ALWAYS irrelevant – they are not included in the analysis.
- **financing costs** are excluded from project analysis, including interest payments (debt) and dividends (equity).
- only **after-tax** cash flows are relevant; these can be distributed back to investors.

Tax or no tax?

- an investment such as purchase of PPE or capital investment is **not subject to tax**.
- the sale of PPE – if it results in a gain or loss on sale, it **is subject to tax.**
  - Gain = more tax paid
  - Loss = less tax paid

Revenue and Expense Tax Calculation

- **Revenues**:
  - **Tax due** = Revenue x Tax %
  - Revenue cash inflow = Revenue x (1 – Tax %)
- **Expenses**:
  - **Tax saving** = Expense x Tax %
  - Income – Expenses = Profit before tax
  - Expense cash outflow = Expense x (1 – Tax %)
- **Depreciation Tax Shield**: NOT a cash outflow but avoids tax ;)
  - **Tax shield** = Depreciation x Tax %
  - You can then add the depreciation amount onto the tax savings for **net savings**!

Investment Appraisal Methods

- **Net Present Value** (NPV)
- **Internal Rate of Return** (IRR)
- **Payback**
- **Accounting Rate of Return** (ARR)

*ARR has not shown up in past exams or exercises.

Net Present Value (NPV)

Considers **TIME VALUE OF MONEY**!
1. Determine initial investment amount
2. Determine PV of future receipts
3. NPV = (1) – (2)

- uses **discounted cash flows** of future cash flows in PV terms.
- minimum / **required rate of return** = **hurdle rate**.
- measures **profitability** of investment.
- if **NPV > 0** then the investment is acceptable:
  - shows initial investment has been recovered
  - required RR has been recovered
  - above two criteria are exceeded.
- if **NPV = 0**, accepting or rejecting is equal.
- if **NPV < 0**, the investment should be rejected because the RRR has not been met.

Internal Rate of Return (IRR)

- uses **interest rate** that sets PV of inflows = PV of cost.
- the interest rate sets **NPV = 0**.
- for formula see Coursebook page 272: can be found using **trial and error**.
- if **IRR** > **RRR**, the project is acceptable.
- if **IRR = RRR**, the project can be accepted or rejected.
- if **IRR < RRR**, the project is rejected.

Payback

eg. $100,000 initial; $30,000 cash inflow p/a = 3.333… years
= 3 years 4 months

Answers should be in years

- this method determines **how many years** it will take for **cash inflow to equal the original investment amount**.
- in general, choose the project with the **shortest payback period** because that means the initial investment is recovered faster.
- the **weaknesses** of the payback method are that it:
  - ignores **time value of money** – unequal annual inflows are subtracted chronologically from the original investment amount.
  - ignores **cash flows occurring after payback period**.
  - does **not** measure **profitability**.

Summer Company

EXAMPLE – COURSEBOOK PAGE 283

1. Prepare a net present value analysis. Based on this analysis, state whether Summer Co. should launch the new product and explain why.

YEAR	CASH FLOWS	PRESENT VALUE FACTOR (14%)	PRESENT VALUE
0	Cost of equipment + inventories = 650,000 + 120,000 = **$(770,000)** **Outflow of cash (initial investment)**	**1** - this initial investment is being paid for today	(770,000) x 1 = $**(770,000)**
1 to 4	$55 x 7,000 = $385,000 in gross profit Fixed manufacturing costs = $(80,000) Selling + general expenses = $(50,000) **Net cash flows per year**: **$217,500**	**2.914** – the amount $217,500 is an annuity over four years. Use table B to find the factor using r = 14%, n = 4	217,500 x 2.914 = $**633,795**
4	Sale of machine: Salvage value / Sale price = $90,000 Book value = 20% x $650,000 = $130,000 Loss on sale = 90,000 – 130,000 = $(40,000) Tax saving = 40,000 x 30% = $12,000 Inventories recovered = $120,000 **Net cash flows from EOY 4: $222,000**	**0.592** – this is found in table A because this is a one-off amount received. Use table A to find the factor using r = 14%, n = 4	222,000 x 0.592 = $**131,424**
		NET PRESENT VALUE	**$(4,781)**

1. **>> continued: Should Summer Co. launch the new product and explain why. (SLIDE 17)**

Based on the above analysis, the launching of this new product is not an acceptable project.

The NPV of $(4,781) is negative. This means that the initial cost of investment financed by Summer Co. has not been recovered. Summer Co.'s required rate of return of 14% has also not been reached.

Therefore, Summer Co. should reject the launch of this new product.

2. Assume that Summer Co. is also evaluating a vehicle replacement proposal. For this proposal, the payback period method indicates that a new vehicle should not be purchased, but the NPV method reaches the opposite result. Give reasons to explain why the payback period and the NPV methods can give different results from the same proposal. (SLIDE 19)

The payback method does not take into consideration the time value of money of cash flows. It also does not take into consideration any cash flows that occur after the initial cost of investment has been recovered. There is a possibility that the vehicle may generate greater economic benefit in the form of sales towards the end of its useful life with Summer Co. – this the payback method does not take into consideration.

This would explain why the NPV analysis gives a positive indication for the vehicle purchase as it does take into consideration the time value of money of future cash inflows as well as cash flows after the initial cost has been recovered.