L10 APSC221 - Taxes

Taxes have a significant impact on the economic viability of a project.

Corporations are taxed at a **flat rate**, while individuals are taxed on a **progressive system** based on income.

Tax Effect on MARR

Taxes effectively reduce the profit of a project.

MARR after tax can be calculated:

$$MARR_{\text{after-tax}} = MARR_{\text{before-tax}}(1 - t)$$

Where (1−t) reflects the reduction in profit due to taxes, and profit is defined as revenue minus expenses.

Tax Loopholes (Bending Rules Around Expenses)

The **Capital Cost Allowance (CCA)** captures the value loss of assets held by corporations. Some companies work hard to maximize the depreciation expensed through operations.

CCA allows corporations to expense depreciation **instead of the full initial purchase price** of an asset. Maximizing depreciation reduces taxable profit.

CCA uses the **Declining Balance Depreciation (DBD)** method and specifies a maximum annual **CCA rate**.

Undepreciated Capital Cost (UCC)

- UCC is the **tax book value** for a class of assets.
- Used **only** for taxation purposes.

- **Does not reflect market value.**

Half-Year Rule

A condition for calculating depreciation for tax purposes:

- Only **half** of the asset's capital cost can be added to UCC in the year of acquisition.
- Prevents manipulation (e.g., buying at year-end and selling in the new year).

Formulas:

$$UCC_{\text{reduced}}(n) = UCC_{\text{end}}(n-1) + \frac{1}{2}\text{purchases} - \text{dispositions}$$

$$CCA(n) = UCC_{\text{reduced}}(n) \times \text{CCA rate}$$

$$UCC_{\text{end}}(n) = UCC_{\text{reduced}}(n) - CCA + \frac{1}{2}\text{purchases}$$

(Not on exam?)

Tax Savings from CCA

Capital Tax Factor (CTF)

The CCA generates tax savings, which reduce the present worth (PW) of the initial cost.

$$CTF = 1 - \frac{td\left(1+\frac{i}{2}\right)}{(i+d)(1+i)}$$

Assumes the asset has **infinite life**.

Capital Salvage Factor (CSF)

Applies when the asset's useful life **ends** and it's sold:

$$CSF = 1 - \frac{td}{i+d}$$

- Applies a **cutoff** to the infinite tax savings assumed by CTF.

- Assumes **no tax implications** from capital gains/losses (not covered in the course).
- If salvage value = 0, CSF has no effect.

The Components of a Complete Tax Calculation

1. **First Cost** → Multiply by **CTF**
2. **Savings or Expenses** → Multiply by **(1 - t)**
3. **Salvage Value** → Multiply by **CSF**

Let me know if you want me to integrate that image into the formulas or make a printable version.