Lecture 9, Nov 15, 2023

Taxation

- Companies are taxed based on taxable income, which revenues minus expenses
  - We will use a flat tax rate
- Revenues can include any income made by the company:
  - Sales revenues
  - Interest revenues
  - Capital gains (selling an asset above its book value)
    - In accounting, the true price of an asset is its book value, so the difference is counted as taxable income
- Expenses and deductions reduce the amount of taxable income:
  - Cost of goods sold
  - SG&A
  - Interest expenses
  - Depreciation expenses
  - Capital losses (selling an asset below its book value)
- Not all expenses are counted towards taxes, e.g. dividends, asset purchases and some others are not counted
  - Asset purchases are not counted because they still have value after you purchase them, so that money is not considered "consumed"
    - Therefore taxes don't affect first costs
  - However after purchase, depreciation and capital gains/losses do affect taxes
  - In general if something does not show up on the income statement (i.e. only balance sheet), it does not affect taxes
- Rate of returns are discounted by the tax rate for cash flows after tax, because we expect less profit
  - MARR and IRR after tax is the pre-tax rate multiplied by 1 minus the tax rate (as an approximation)
    - This gives the WACC
  - Note that equity rates (i.e. numbers from CAPM) are after-tax; so we don't need to adjust these
  - $R_{WACC} = \frac{E}{E+D} R_E + \frac{D}{E+D} R_D (1-t)$
    - Only the debt rate is discounted by tax

Capital Cost Allowance (CCA)

- Depreciation is not a real cash flow, but claiming depreciation saves on taxes
  - A company will want to depreciate as much as possible, as fast as possible due to time value of money
  - Government regulations exist to make sure companies can't arbitrarily depreciate
  - Note that on the actual balance sheet, a company might want to depreciate more slowly because this makes their income look better, but for tax purposes they must use CCA; this results in a discrepancy on the balance sheet
- CCA is the Canadian system for calculating depreciation and taxes
  - The capital cost allowance (CCA) is the amount of depreciation
  - The undepreciated capital cost (UCC) is the book value
  - The proceeds from disposition is the salvage value from selling the asset
- Assets are pooled into classes specified by the policy
  - All assets are pooled into classes, and the total value of all assets in each class is deprecated together at some specified rate
    - Assets are not depreciated individually
  - The depreciation method is similar to declining balance, but new assets purchased this year are only depreciated at half the rate
    - CCA = CCA rate times (new assets this year / 2 + UCC from last year)

        * This is known as the half-year rule
    - UCC this year is UCC from last year, plus new assets this year, minus CCA
- The amount of tax savings each year is the CCA from that year times the tax rate; this is recorded as a positive cash flow
- When selling the asset, the book value can be different from the salvage value
    - *Open book*: other items exit in the same CCA pool
        * Selling the asset does not close out the pool
        * Simply reduce the UCC of the pool by the salvage value
    - *Closed book*: no other items in the same pool; there are 3 cases:
        * *Terminal loss*: salvage value less than book value
            - Claim the loss, book value minus salvage value, which decreases taxable income
        * *Recapture*: salvage value greater than book value, but less than original price
            - Report the recapture, salvage value minus book value, which increases taxable income
        * *Capital gains*: salvage value greater than the original price
            - Report the recapture, original price minus book value, which increases taxable income
- Example: purchasing $5000 worth of desks (class 8, CCA rate of 20%); what are the CCA and UCC for the first 4 years, assuming there is nothing in the same pool?
    - First year: $5000 in purchases, no UCC from last year, CCA is 20% of $5000 divided by 2 = $500, so we're left with $4500
    - Second year: $0 in purchases, $4500 from last year, CCA is 20% of $4500 = $900, so we're left with 3600
    - This gives us $2304 at the end of the 4th year
    - In year 5, we sell the desks for $1500; what is the gain/loss as a result of selling the desks, assuming open book?
        * CCA in year 5 is $460
        * UCC after year 5 is $2304, minus the CCA and minus the $1500 sell value
        * Since this is open book, we have no direct gains or losses, so no direct tax implications
    - What if there are no other assets in class 8?
        * Since the UCC must go to 0, the book value for the desks would be $2304 minus UCC, or $1844
        * We sold it for a loss, so we can claim a loss of $344, which is a tax saving
    - What if we sold it for $2500?
        * This is greater than book value, so we have a recapture of $2500 - $1844 = $656
        * This makes the taxes go up

Calculating Present Worth

- Using the explicit method:
    - Use the WACC (after-tax discounted MARR)
    - Revenues are discounted by the tax rate
    - No changes to first costs
    - Take into account depreciation tax savings every year by calculating CCA every year
    - Account for terminal losses or gains by comparing the final UCC to the salvage value, in a closed-book scenario
- The *tax benefit factor* τ is defined as the ratio of the present worth of tax savings to the first cost of equipment
    - Assets have inherent value but also value associated with tax benefits
    - τ is how much every dollar spent will save in taxes
        * Note that this assumes we will keep the asset around forever, so we get the tax savings for the rest of time
    - This depends on the depreciation method, tax rate, WACC, etc
    - For regular declining balance, $\tau_{db} = \dfrac{td}{i+d}$ where i is the after-tax WACC, d is the depreciation rate and t is the tax rate
        * This applies to asset disposition

  - For declining balance with half-year rule, $\tau_{1/2} = \dfrac{td}{i+d}\left(\dfrac{1+\frac{i}{2}}{1+i}\right)$
    * This applies to asset purchases
- Using tax benefit factors, the *effective first cost* is reduced because of tax savings
  - $PW(FC) = -FC + FC\tau_{1/2} = -FC(1-\tau_{1/2})$
  - The term $(1-\tau_{1/2})$ is known as the *capital tax factor* (CTF)
- The *effective salvage value* of selling an asset is reduced because of losing tax savings
  - Since the CTF assumes we keep the tax forever, when we actually sell the asset we need to correct for the tax savings that we lose
  - $PW(S) = (S - R\tau_{db})(P/F, i, N)$
  - S is the salvage value, R is the reduction in the pool due to selling the asset
  - The term $(1-\tau_{db})$ is known as the *capital salvage factor* (CSF)
- Using tax benefit factors we can calculate present worth as:
  - Use the effective first cost
  - Discount revenues by the tax rate
  - Use the effective salvage value, which depends on whether we have an open or closed book scenario
    * For open-book, $R = S$, so $PW(S) = S(1-\tau_{db})(P/F, i, N)$
    * For closed-book, $R = UCC$, and we also need to account for possible terminal loss/gain