FIN 401: Capital Purchases Problems

The 8 Step Process

Big idea

Provide a step-by-step guide for solving capital budgeting and purchasing problems to determine whether a firm should invest in a new long term asset or project.

What are Capital Purchases?

When a company is considering buying **new equipment or launching a new project**, they can't just look at the price tag today and revenues tomorrow. They need to determine if the future cash flows creates value for the firm **today.**

An Overview

This process consists of **8 Steps** in in total and incorporates the concept of the time value of money:

1. Present Value (PV) of Capital Expenditures
2. PV of Incidental Cash Flows (Incremental and After-tax)
3. PV of Operating Cash Flows (OCF)
4. PV of Changes in Net Working Capital (NWC)
5. PV of NWC Recovery
6. PV of Salvage Value
7. PV of CCA Tax Shields
8. Sum Steps 1 - 7

Remember, IF:

Net Present Value (NPV) > 0 = **Take on Project**
Net Present Value (NPV) < 0 Do **NOT** Take on Project

As we go through the 8-Steps, we will be covering the following problem so we understand how to identify the steps in capital purchases.

Solar Inc wants to launch a Ultra-Fast line of Solar Panels, below are the project details:

- $500,000 for equipment (t=0).
- Solar Inc. currently sells another line, the Premium Solar Panel. However, launching this new panel will cause the company line to lose revenue from the Premium Solar

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Panel of $30,000 in pre-tax revenue each year because some customers will switch. The loss will occur for 5 years

- The project will generate $150,000 in *pre-tax* revenue and costs annually. The After-Tax Operating Cash Flow is calculated at $120,000/year for 5 years.
- Requires an immediate $40,000 investment at t=0. This will be fully recovered at the end of Year 5.
- The equipment can be sold for $80,000 at the end of Year 5.

- **Tax & Depreciation:** Corporate tax rate is **30%**. The equipment belongs to a **20% CCA class**.
- **Cost of Capital (WACC): 12%**.

1. Present Value (PV) of Capital Expenditure

The **INITIAL COST** of the project (e.g buying a machine), PV is the amount **SPENT**

- Usually occurs at Year 0 (today)
- Is usually negative number as it is an outflow of cash
- Usually identify this in the problem as major expenditures (Property, plant, long-term equipment)
- No Time Value of Money (TVM) calculation is needed as it already occurs when the time = 0

What does this look like in our question?

This is the **$500,000** equipment at t =0
We regard this as -$500,000 as it is an outflow of money

2. Present Value (PV) of Incidental Cashflows

The **INDIRECT EFFECTS** that a new project has on the rest of the company's **EXISTING** cashflows:

- 2 Types:
  - Erosion = When a new product steals sales from an existing product that the company already sells
  - Synergy = When a new project actually boosts the sales or lowers the cost of existing project

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Financial Calculator Inputs

Setup

- **N**= (# of Years the side effect lasts on the project)
- **PMT** = Annual after-tax loss/gain from erosion/synergy

OR

- **PMT =** Annual pre-tax loss/gain from erosion/synergy * (1 - Tax rate)
- **I/Y** = Firm's discount rate (WACC calculation can be found in previous modules)
- **FV**=0

What does this look like in our question?

Solar Inc. currently sells another line, the Premium Solar Panel. However, launching this new panel will cause the company line to lose revenue from the Premium Solar Panel of **$30,000** in pre-tax revenue each year because some customers will switch. The loss will occur for **5 years.**

- N= 5 years
- PMT = -$30,000*(1-0.3) = -21,000
- I/Y = 12%
- FV=0
- PV = -75,700.30
    - This will come out as a (+) CF but it is regarded as a (-) CF as it is erosion

3. Present Value (PV) of Operating Cashflow (OCF)

DAY-TO-DAY profit the project generates after paying taxes but before accounting for financing costs

- We regard the OCF as TVM (Time Value of Money) costs:
    - The OCF (Operating Cashflow) occurs as a regular cash inflow (+) so it is treated as an annuity
    - This cash inflow is represented on the financial calculator as (+) number as a PMT

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RECALL:

Annuity = Series of cash flows characterized by a sequence of **EQUAL** payments or cash inflows made at regular, fixed time intervals

Financial Calculator Inputs

Setup

- **N= # of Years of the project**
- **PMT = Pre-tax OCF *(1-Tax rate)**
- **I/Y = Firm's discount rate (WACC)**
- **FV= 0**

What does this look like in our question?

The project will generate $150,000 in *pre-tax* revenue and costs annually. The After-Tax Operating Cash Flow is calculated at **$120,000/year** for **5 years**.

- N= 5
- PMT = 120,000
  - It is already specified that this CF is after-tax
- I/Y = 12%
- FV=0
- PV = $432,573.14
  - This will come out as a (-) value but we regard it as a (+) value as it is the PV of CF we earn in the coming years

4. Present Value (PV) of Networking Capital (NWC)

When you **START** a **PROJECT**, you often need **"UPFRONT CASH"** to buy **INVENTORY** or **FUND** the project

- Outflow of cash at Year 0 (-)
- No Time Value of Calculation needed as your CF is already at 0

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What does this look like in our question?

Requires an immediate **$40,000** investment at t=0. This will be fully recovered at the end of Year 5.

- NWC = -$40,000

5. Present Value (PV) of Networking Capital (NWC) Recovery

At the **END** of the project's **LIFE**, you **SELL** off that extra **INVENTORY** and collect your receivables. You get that **"UPFRONT CASH"** back

Financial Calculator Inputs

Setup

- **N= # of Years of the project**
- **PMT = 0**
- **I/Y = Firm's discount rate (WACC)**
- **FV= NWC Recovery Amount at final year**

What does this look like in our question?

Requires an immediate **$40,000** investment at t=0. This will be fully recovered at the end of Year 5.

- N= 5
- PMT = 0
- I/Y = 12%
- FV= - 40,000
- PV = $22,697.07

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6. Present Value (PV) of Salvage Value

The amount of **MONEY** you expect to **RECEIVE** from selling the **EQUIPMENT** at the **END** of the **PROJECT**

- TVM Application:
  - Taking the FV of the SALVAGE VALUE → finding the PV

Financial Calculator Inputs

Setup

- **N**= # of Years of the project
- **PMT** = 0
- **I/Y** = Firm's discount rate (WACC)
- **FV**= Salvage Value
- **CPT** for PV

What does this look like in our question?

The equipment can be sold for **$80,000** at the end of **Year 5.**

- N= 5
- PMT = 0
- I/Y = 12%
- FV= 80,000
- PV= $45,394.15
  - Will come as a negative in calculator but is a (+) value as it is the PV of the equipment sold at the end of Year 5

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7. Present Value (PV) of Salvage Value

In Canada, the government lets you deduct depreciation (CCA) to lower your taxable **INCOME.** A Tax Shield is the actual cash you save on taxes because of that deduction

- Using the PVCCATS formula:

Inputs

Setup

$$\text{PVCCATS} = \left[\frac{I \cdot d \cdot T_c}{d+r} \times \frac{1+0.5r}{1+r}\right] - \left[\frac{S_n \cdot d \cdot T_c}{d+r} \times \frac{1}{(1+r)^n}\right]$$

I = Total initial capital investment (asset cost)

d = CCA (depreciation) tax rate for the asset's class

T_c = Corporate marginal tax rate

r = Discount rate or cost of capital (WACC)

S_n = Salvage value (expected resale price) at year n

n = Lifespan / duration of the project in years

What does this look like in our question?

$$\left[\frac{\$500{,}00 \times 0.20 \times 0.30}{0.20 + 0.12} \times \frac{1 + (0.5)^*(0.12)}{1 + 0.12}\right] - \left[\frac{\$45{,}000 \times 0.2 \times 0.3}{0.20 + 0.12} \times \frac{1}{(1+0.12)^5}\right]$$

= $80,424.39

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8. Sum of All Steps

Together, we will add all the Present Values found in our previous steps along with the amount found from our PVCCATS formula.

What does this look like in our question?

[-$500,000] + [-$75,700.30] + [$432,573.14] +[-$40,000] + [$22,697.07] + [$45,394.15] + [$ 80,424.39]

= - $34,611.55

Therefore, since we have ended with a **NEGATIVE NPV**, we will **not** take on this project.