

# CHAPTER 9: FUNDAMENTALS OF CAPITAL BUDGETING

Business Finance 3220

capital expenditure  
- money out to set up something

main diff from  
income/cash flows

### The basics

- Only include incremental cash flows
- Total Free Cash Flow for the project =  $(\text{Revenues} - \text{Costs} - \text{Depr.}) * (1 - T) + \text{Depreciation} - \text{CapEx} \pm \text{Change in NWC}$
- Don't forget:
  - Opportunity costs: land, e.g. cost of forgone option
  - Externalities: can be good or bad
  - After-tax salvage value =  $\text{Sale price} - (\text{Capital gain} * T)$
- MACRS vs. straight-line depreciation
- Real options

$\text{NWC} = \text{current asset} - \text{current liability}$

new products can cannibalize old products from market

- depreciation exp but not cash flow  
just allowance for machine ↓ in value but not cash flow coming out of pocket

### Basic format: 5-year project

	0	1	2	3	4	5
-CapEx						+ATSV
-NWC						+NWC
	+inc. FCF	+inc. FCF	+inc. FCF	+inc. FCF	+inc. FCF	+inc. FCF

- At  $t=0$ , invest in CapEx (Property, Plant and Equipment, e.g.)
  - Buy raw materials and build up initial inventories (Initial NWC)
- Earn incremental free cash flow each year of the project:
  - $(\text{Revenues} - \text{Costs}) * (1 - T) + \text{Depreciation}(T) = \text{inc. earnings} + \text{depreciation}$
- At  $t=5$ , earn last year of incremental free cash flow, plus:
  - Return of NWC. (Stop buying new raw materials. Sell remaining inventory.)
  - After-tax salvage value. (After project ends, sell PP&E for salvage value. Calculate ATSV.)

### More on NWC change in NWC from year to year

- Why do we have to consider changes in NWC separately?
  - GAAP requires sales be recorded on the inc. statement when made, not when cash is received
  - GAAP also requires that we record cost of goods sold when the corresponding sales are made, whether we have actually paid our suppliers yet
  - Finally, we have to buy inventory to support sales although we haven't collected cash yet
  - Including changes in NWC helps adjust for the difference between accounting sales/costs and actual cash receipts/payments.

NWC smooth out amount diff betw finance/ac

we get initial NWC back at end when we sell inventory

change in NWC

0	1	2	3	4	5
-1M	0	0	0	0	+1M

### Depreciation

- The depreciation expense used for capital budgeting should be the depreciation schedule required by the IRS for tax purposes
- Depreciation itself is a non-cash expense; consequently, it is only relevant because it affects taxes
- Depreciation tax shield =  $(\text{Depreciation} * T)$ 
  - D = depreciation expense
  - T = marginal tax rate

### Computing Depreciation

- Straight-line depreciation *doesn't actually mimic how depr. in value*
  - $D = \text{Initial cost} / \text{number of years}$
  - Very few assets are depreciated straight-line for tax purposes, but commonly used for book purposes.
- MACRS
  - Need to know which asset class is appropriate for tax purposes
  - Multiply percentage given in table by the initial cost
  - Depreciate to zero
  - Mid-year convention (yr. 2 dep.% > yr. 1 dep.%) *year one is partial yr making yr 2 > yr 1*
  - The book does this incorrectly by starting at time zero, instead of year 1. We will use it correctly.

### After-tax Salvage

- If the salvage value is different from the book value of the asset, then there is a tax effect
- Book value = initial cost - accumulated depreciation
- After-tax Salvage Value = Sale price - (Capital gain \* T)
- Capital gain = (Sale price - Book value)

### Example: Depreciation and After-tax Salvage

- You purchase equipment for \$100,000 and it costs \$10,000 to have it delivered and installed. Based on past information, you believe that you can sell the equipment for \$17,000 when you are done with it in 6 years. The company's marginal tax rate is 40%. What is the depreciation expense each year and the after-tax salvage in year 6 for each of the following situations?

salvage value - what its left over worth is... whatever can get for them

we take depr bigger (shield) or will be

### Example: Straight-line Depreciation

- Suppose the appropriate depreciation schedule is straight-line
- The "depreciable basis" is 110,000 (cost plus delivery/installation)
  - $D = 110,000 / 6 = 18,333.33$  every year for 6 years
  - BV in year 6 = 0
  - After-tax salvage =  $17,000 - .4(17,000 - 0) = 10,200$

A: depr to 0  
 $D = 18333.33$   
 $ATSV = 17000(1-.4) = 10,200$   
 A better choice in terms of time value of money

rather take big depreciation tax shield now - as much as can as soon as can

### Example: Three-year MACRS

Year	MACRS percent	D	BV in year 6 = 110,000 - 36,663 - 48,884 = 16,302 - 8,151 = 0
1	.3333	.3333(110,000) = 36,663	
2	.4444	.4444(110,000) = 48,884	After-tax salvage = 17,000 - .4(17,000 - 0) = \$10,200
3	.1482	.1482(110,000) = 16,302	Note: MACRS assumes zero salvage value
4	.0741	.0741(110,000) = 8,151	

B:  $\frac{110000-17000}{6} = 15500$   
 $D = 15500$   
 $ATSV = 17000 - (17000 - 17000)0.4 = 17000$

3yr schedule has 4 years ave to partially rather do macrs gives bigger depr. tax shield sooner

### Project evaluation problem

- Your firm is contemplating the purchase of a new \$720,000 computer-based order entry system. The system will be depreciated straight-line to zero over its five-year life. It will be worth \$75,000 at the end of that time. You will save \$260,000 before taxes per year in order processing costs, and you will be able to reduce net working capital by \$110,000 (this is a one-time reduction). If the tax rate is 35%, what is the IRR for this project?
- Suppose your required return is 20% and your pretax cost savings were \$300,000 per year. Will you accept the project? What if the savings were \$240,000 per year?

cost savings bigger IRR even higher so will be even better project

no we'll save on costs  
 and project ending above of IRR

buying machine reduces NWC making cash inflow begin then outflow

0	1-4	5
20000	219400	48750 = ATSV = 75000(1-.35)
10000	<del>20000</del> total	-110000 (NWC)
-60000	219400	219400
		159150

IRR = 21.105%

### Problem 25

- Too long to type here. Please refer to your textbook as we solve this one.

sales	30000	0	1-9	10
-COGS	-19000	-25000		No ATSV
GROSS $\pi$	12000	-10000	+8025	+10000
-SG+A	-2000			+8025
-Depr	-2500	-35000	+8025	+18025
EBIT	7500			
-TAX	2475			
NI	4875			

NPV = 9556.77  
 should only -1000 so EBIT = 8500  
 Mil Add de = 8025 F

limit is sunk cost irrelevant to analysis

Rev	0	1-9	10
-cost	-260000		
-Depr.	-144000		
EBIT	+116000		
-TAX	-40600		
NI	75400		
+Depr.	+144000		

Depr. =  $\frac{720000}{5} = 144000$   
 now no longer want because IRR less than 20% at 18.