DECISION MAKING AND SCENARIOS
## MODULE 2.4 – Evaluating Projects

Example: New Production Machine

Professor Robert Holthausen
Professor Richard Lambert

Example - New Production Machine

- A company is considering purchasing a new machine that saves costs on the production of a product they sell. The machine costs $200 million and it would save $50 million in production costs in each of the next 5 years. The division manager expects to be able to sell the machine after 5 years for $20 million. Assume, for simplicity that there are no working capital effects associated with the new machine and that revenues are unaffected.

- Ignoring taxes, should the machine be purchased if the discount rate is 10%

New Production Machine
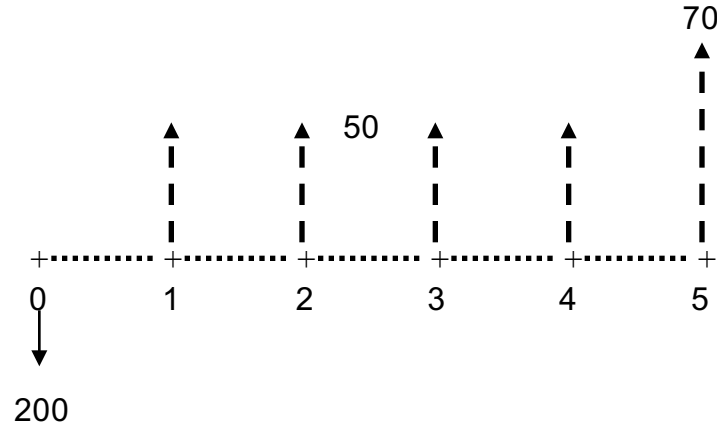
$$NPV = -200 + (50/1.1 + 50/1.1^2 + 50/1.1^3 + 50/1.1^4 + 50/1.1^5) + (20/1.1^5) = \mathbf{1.96\ million}$$

Accept the project

**What if the tax rate is 40%.
Then what happens?**

New Production Machine

- How does the initial investment change with taxes?

  It doesn't. The initial investment is still -$200. Remember, in this case the initial investment is a capitalized cost and the after-tax outflow remains the same.

New Production Machine

- What are the annual cash flows for years 1 through 5 with taxes? (Assume depreciation is on a straight-line basis with a zero estimated salvage value.)

	Tax Return	Cash Flows
Annual cash savings	$ 50	$ 50
Annual depreciation ($200/5)	(40)	
Annual effect on taxable income	10	
Tax rate	40%	
Net effect of taxes	4 ┈┈▶	(4)
Annual Cash Flows		$46

New Production Machine

- What is the salvage value at the end of Year 5 with taxes?

	Tax Return	Cash Flows
Original cost of project	$ 200	
Accumulated depreciation	(200)	
Tax basis (book value for tax purposes)	-0-	
Proceeds from sale	20	$ 20
Gain on sale	20	
Tax rate	40%	
Net effect of taxes	8	(8)
Net Salvage Value		$ 12

Therefore...

$$NPV = -\$200 + (\$46/1.1 + 46/1.1^2 + 46/1.1^3 + 46/1.1^4 + 46/1.1^5) + (\$12/1.1^5)$$

$$= -\$18.17 \text{ million}$$

New Production Machine – Alternative Scenario

- Let us suppose that the accumulated depreciation was only $150 at the end of year 5?

	Tax Return	Cash Flows
Original cost of project	$ 200	
Accumulated depreciation	(150)	
Tax basis (book value for tax purposes)	-50-	
Proceeds from sale	20	$ 20
Loss on sale	(30)	
Tax rate	40%	
Net effect of taxes	(12) ┄┄┄➤	12
Net Salvage Value		$ 32

New Production Machine – Alternative Scenario

- But if you change the accumulated depreciation by year 5, that has to change the annual cash flows for years 1 through 5 because of the different amount of depreciation

	Tax Return	Cash Flows
Net annual cash savings	$ 50	$ 50
Annual depreciation	(30)	
Annual effect on taxable income	20	
Tax rate	40%	
Net effect of taxes	8 ┈┈►	(8)
Net Annual Cash Flows		$42

What will happen to the NPV? Will it go up or down?

$$\text{NPV} = -\$200 + (\$42/1.1 + 42/1.1^2 + 42/1.1^3 + 42/1.1^4 + 42/1.1^5) + (\$32/1.1^5)$$

$$= -\$20.92 \text{ million}$$