# DECISION MAKING AND SCENARIOS
## MODULE 2.4 – Evaluating Projects

## Example: New Production Machine
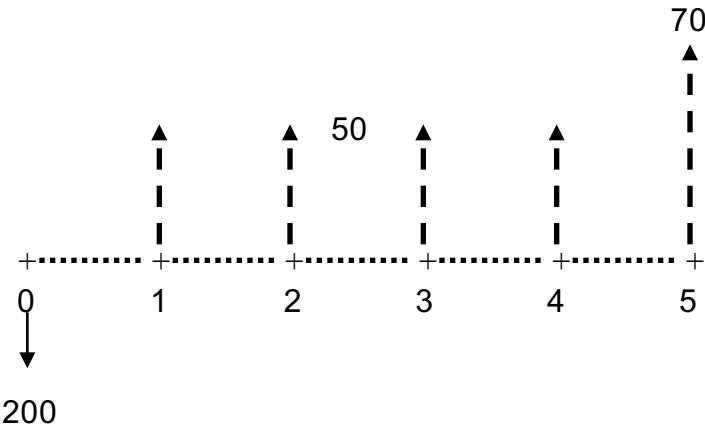
Professor Robert Holthausen
Professor Richard Lambert

**Wharton**
UNIVERSITY *of* PENNSYLVANIA   ONLINE

# 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$^5$) = **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 |
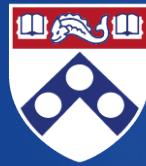
# New Production Machine – Alternative Scenario

- 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?

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 million