



# Lecture 17

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## Income Taxes



# Definitions

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- Net versus gross income:
  - Gross income = revenue or receipts
  - **Net** income = revenue **minus expenses**
- Corporate tax is on **net** income (profit)
  - Individual tax is on **gross** income
    - (You don't get to deduct your rent payments!)
- Income taxes are an additional **expense**



# Example

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- Investment with 100% salvage value
  - E.g., land
- Buy for \$110K (plus \$3K per year)
  - Or rent for \$25K per year
- Keep for 10 years
- Income tax rate = 40%
- Remember: *Land is not depreciated!*



# Example

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<u>Year</u>	<u>Cash flow</u>	<u>Delta Inc.</u>	<u>Taxes</u>	<u>After-tax cash flow</u>	
0	-\$110K			-\$110K	
1-10	+\$22K	+\$22K	-\$8.8K	+\$13.2K	
10	+\$110K			+\$110K	

- Rate of return =
  - 20% before taxes,
  - 12% after taxes!
    - Why lower???



# Observations

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- Land is *capital*
  - Land purchase is not an expense!
  - Land sale proceeds are not revenue!
    - Just convert cash assets into land, vice versa
- Income taxes are an additional expense
  - *But the timing of this expense is critical!*
  - Things can vary a great deal
    - Depending on the timing of depreciation



# Depreciation example

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- Investment with depreciation
- Buy equipment for \$110K for 10 years:
  - No salvage value
  - Straight-line depreciation
  - Savings of \$32K per year
  - Costs of \$5.7K per year
    - Net savings of \$26.3K per year

# Depreciation example

<u>Year</u>	<u>Cash flow</u>	<u>Deprec.</u>	<u>Tax. Inc.</u>	<u>Taxes</u>	<u>After-tax cash flow</u>
0	-\$110K				-\$110K
1-10	+\$26.3K	-\$11K	+\$15.3K	-\$6.12K	+\$20.18K

- **Taxable** income = income - depreciation
  - Depreciation is treated as an expense!
- Rate of return =
  - 20.1% before taxes,
  - 12.9% after taxes

# Longer depreciation (25 years)

<u>Year</u>	<u>Cash flow</u>	<u>Deprec.</u>	<u>Tax. Inc.</u>	<u>Taxes</u>	<u>After-tax cash flow</u>
0	-\$110K				-\$110K
1-10	+\$26.3K	-\$4.4K	+\$21.9K	-\$8.76K	+\$17.54K
11-25	\$0K	-\$4.4K	-\$4.4K	+\$1.76K	+\$1.76K

- What would you expect:
  - Will IRR go up or down?





# Comparison

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- 10 year depreciation schedule:
  - Rate of return =
    - 20.1% before taxes,
    - 12.9% after taxes
- 25 year depreciation schedule:
  - After-tax rate of return = 10.6%
    - Why is it *less*?
  - What happens to **before**-tax rate of return?



# Observations

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- Depreciation lifetime need not equal actual lifetime!
- After-tax IRR went down
  - Because the tax benefit due to depreciation was *postponed*



# Accelerated depreciation

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- 7 year depreciation lifetime:
  - Double declining balance for 4 years
  - Followed by straight line for 3 years
- What would you expect:
  - Will IRR go up or down?

# Accelerated depreciation

<u>Year</u>	<u>Cash flow</u>	<u>Deprec.</u>	<u>Tax. Inc.</u>	<u>Taxes</u>	<u>After-tax cash flow</u>
0	-110				-110
1	26.3	31.43	-5.13	-2.05	28.35
2	26.3	22.45	3.85	1.54	24.76
3	26.3	16.03	10.27	4.11	22.19
4	26.3	11.45	14.85	5.94	20.36
5	26.3	9.54	16.76	6.70	19.60
6	26.3	9.54	16.76	6.70	19.60
7	26.3	9.54	16.76	6.70	19.60
8	26.3		26.3	10.52	15.78
9	26.3		26.3	10.52	15.78
10	26.3		26.3	10.52	15.78
<b>Sum</b>		<b>110</b>			



# Accelerated depreciation

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- How to figure out after-tax IRR?
  - Use column for *after-tax cash flow*
  - After-tax IRR = 14.7%
- Tax benefit of depreciation accelerated,
  - So after-tax IRR went up (>12.9%)
- Note: Change in taxable income can be *negative!* (this is called a “tax loss”)



# Capital versus expense

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- Capital:
  - Acquisition of assets (or life extension)
  - Depreciated only over time
- Expense:
  - Repairs, supplies, etc.
  - “Depreciated” all at once
  - More tax beneficial,
    - Because tax deduction comes *sooner!*

# Expense example

<u>Year</u>	<u>Cash flow</u>	<u>"Deprec."</u>	<u>Tax. Inc.</u>	<u>Taxes</u>	<u>After-tax cash flow</u>
0	-\$110K	-\$110K	-\$110K	+\$44K	-\$66K
1-10	+\$26.3K		+\$26.3K	-\$10.5K	+\$15.8K

- After-tax IRR = 20.1%
  - Same as before-tax IRR
    - The same 40% tax applies to all cash flows
  - *Higher* than after-tax IRR with depreciation
    - May be willing to spend more for expenses than for capital!



# General method

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- Determine before-tax cash flows
- Determine change in taxable income:
  - Revenues - depreciation & other expenses
- Compute income taxes:
  - Taxable income times tax rate
- Determine after-tax cash flow:
  - Before-tax cash flow - income taxes





# Examples discussed above

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- Simplifying assumptions:
  - Actual benefits were equal each year
  - Tax payments at end of year
  - Constant tax rate
- Government gets 40% of next benefit in all cases, but *timing is critical!*
  - Government gets constant dollar amount,
    - *Not constant value!*



# Examples discussed above

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- Government gets 40% of next benefit in all cases, but timing is critical!
- Same concept applies to **losses**:
  - Government foregoes tax revenue equal to 40% of depreciation and other expenses



# Observation

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- In addition to higher IRR,
  - Rapid depreciation also leaves more **cash** available for other investments:
    - May be useful if money is tight
  - Payback period =
    - 4.18 years with immediate depreciation
    - 5.45 years with 10-year depreciation
    - 6.27 years with 25-year depreciation, etc.



# Graduated income tax

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- Constant tax rate:
  - “Flat tax”
- If tax rate is not constant:
  - “Graduated” income tax



# Graduated income tax

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- Example:
  - 15% if taxable income  $<$  \$50K
  - \$7.5K + 25% of amount above \$50K
    - If taxable income between \$50K and \$75K
  - \$13.75K + 34% of excess over \$75K
    - If taxable income  $>$  \$75K



# Double taxation

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- Corporate income, personal dividends are both taxed:
  - More advantageous to get benefits in form of higher stock price, not dividends!
  - (But partnerships and sole proprietorships are taxed *only* as individual income)
- If key decision makers are stock owners
  - Consider *both* personal and corporate tax!



# Computation of total tax rate

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- State taxes are deductible as expenses on federal tax return:

- So *total* tax rate =  $s + (1-s) f$

- (if taxable income is defined the same way)

where

- State tax rate =  $s$

- Federal tax rate =  $f$

- If  $s=9\%$  and  $f=34\%$ , then  $.09+.91(.34)=.4$



# Changes over time

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- Tax rates may change over time:
  - New laws passed
  - New “tax bracket”
- Use *predicted* tax rate





# Review

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- We learned how to find after tax-IRR by
  - Determining before-tax cash flows
  - Determining change in taxable income:
    - Revenues - depreciation & other expenses
  - Computing income taxes
  - Determining after-tax cash flow
- We saw effects of depreciation schedule on *after*-tax IRR