Lecture 17

Income Taxes
Definitions

- 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

- 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

<table>
<thead>
<tr>
<th>Year</th>
<th>Cash flow</th>
<th>Delta Inc.</th>
<th>Taxes</th>
<th>After-tax cash flow</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>-$110K</td>
<td></td>
<td></td>
<td>-$110K</td>
</tr>
<tr>
<td>1-10</td>
<td>+$22K</td>
<td>+$22K</td>
<td>-$8.8K</td>
<td>+$13.2K</td>
</tr>
<tr>
<td>10</td>
<td>+$110K</td>
<td></td>
<td></td>
<td>+$110K</td>
</tr>
</tbody>
</table>

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

- 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

- 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

<table>
<thead>
<tr>
<th>Year</th>
<th>Cash flow</th>
<th>Deprec.</th>
<th>Tax. Inc.</th>
<th>Taxes</th>
<th>After-tax cash flow</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>-$110K</td>
<td></td>
<td></td>
<td>-$110K</td>
<td>-$110K</td>
</tr>
<tr>
<td>1-10</td>
<td>+$26.3K</td>
<td>-$11K</td>
<td>+$15.3K</td>
<td>-$6.12K</td>
<td>+$20.18K</td>
</tr>
</tbody>
</table>

- **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)

<table>
<thead>
<tr>
<th>Year</th>
<th>Cash flow</th>
<th>Deprec.</th>
<th>Tax. Inc.</th>
<th>Taxes</th>
<th>After-tax cash flow</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>-$110K</td>
<td></td>
<td></td>
<td></td>
<td>-$110K</td>
</tr>
<tr>
<td>1-10</td>
<td>+$26.3K</td>
<td>-$4.4K</td>
<td>+$21.9K</td>
<td>-$8.76K</td>
<td>+$17.54K</td>
</tr>
<tr>
<td>11-25</td>
<td>$0K</td>
<td>-$4.4K</td>
<td>-$4.4K</td>
<td>+$1.76K</td>
<td>+$1.76K</td>
</tr>
</tbody>
</table>

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

- 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

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

- 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

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

- 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

- 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

- **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!

<table>
<thead>
<tr>
<th>Year</th>
<th>Cash flow</th>
<th>&quot;Deprec.&quot;</th>
<th>Tax. Inc.</th>
<th>Taxes</th>
<th>After-tax cash flow</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>-$110K</td>
<td>-$110K</td>
<td>-$110K</td>
<td>+$44K</td>
<td>-$66K</td>
</tr>
<tr>
<td>1-10</td>
<td>+$26.3K</td>
<td>+$26.3K</td>
<td>-$10.5K</td>
<td>+$15.8K</td>
<td></td>
</tr>
</tbody>
</table>
General method

- 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

- 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

- 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

- 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

- Constant tax rate:
  - “Flat tax”

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

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

- 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

- 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

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

- 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