Lecture 14

Accounting and Depreciation
Observations

- Depreciation methods are *conventions*
  - Not based strictly on market value!
- Different types of assets have:
  - Different recovery periods
    - (Only partially related to actual lifetime)
  - Different allowable depreciation schedules
    - (Usually codified in lookup tables)
Depreciation

- We will cover a few typical depreciation schedules
  - Also use of lookup tables
- Determining the right recovery period and depreciation schedule is complex
  - Best done by tax lawyers and accountants!
  - We will just get a feel for the basic ideas
Straight line depreciation

- Recovery period = n
- Depreciation rate = 1/n
  - (Same for all years!)
- Depreciation = (first cost - salvage)/n
  - (Same in all years)
- Book value in period t
  = (book value in period t-1) - depreciation
Example

- A machine tool has:
  - First cost $35,000
  - Recovery period 20 years
    - (based on estimated life)
  - *Estimated* salvage value $3,500
  - Depreciation = \((\$35,000 - \$3,500)/20\)
    = $1,575 (same in all years)
Straight line depreciation

- Writes off capital investment *linearly*
- Estimated salvage value is considered:
  - Only *estimated*!
  - Actual (future) salvage value is not known when depreciation schedule is set
Accelerated depreciation

- Depreciation methods are *conventions*
  - Not based strictly on market value!
- With *accelerated depreciation*,
  - Depreciation expenses happen sooner than with straight line depreciation
- Income tax liability is reduced early on,
  - Greater in future years
  - This is beneficial due to *time value of money!*
Declining balance depreciation

- Recovery period = \( n \)
- Depreciation rate = \( f \)
  - But applied to book value, not first cost!
- Depreciation in period \( t \)
  \[ = f \times (\text{book value in period } t-1) \]
  - Decreases each year,
    since book value decreases!
Double declining balance

- Most common form of declining balance is *double* declining balance:
  - $f = 2.0/n$, where $n = \text{recovery period}$
Declining balance example

- Consider the same machine tool
- \( f = \frac{2.0}{20 \text{ years}} \)
  \[ = 10\% \text{ per year (or \( .1 \))} \]
- Depreciation in year 1 = \( .1 \ ($35,000) \)
  \[ = \$3,500 \text{ (versus \$1,575 for straight line)} \]
- Depreciation in year 2
  \[ = .1 \ ($35,000 - \$3,500) = \$3,150, \text{ etc.} \]
Observations

- Note that the salvage value does *not* enter into the computation of either
  - The depreciation charge, or the book value when using declining balance method
- Declining balance does *not* give zero (or salvage value) in year n:
  - *Combine* declining balance and straight line
    - To get desired ending value
Declining balance depreciation

- *Accelerated* depreciation
  - Compared to straight line method
- Book value reduced by same *fraction* each year
  - Not same *actual amount*, as in straight line
- Converges to an *implied* salvage value
  - Different than estimated salvage value
1986 Tax Reform Act introduced:

- Modified accelerated cost recovery system (MACRS)
- Basically a set of lookup tables
  - (See Table 13-2 in text, for example)
MACRS

- Standardized recovery periods
  - Personal property:
    - 3, 5, 7, 10, 15, or 20 years
      - Depends on type of property!
  - Real property (buildings, etc.):
    - 27.5 or 39 years
  - Land is not depreciated:
    - It’s always there!
      - Its value is assumed not to decline
MACRS

- Depreciation method
  - Personal property:
    - Starts with double declining balance method
    - Switches to straight line method
      - When straight line method becomes more favorable!
  - Real property (buildings, etc.):
    - Straight line method
MACRS

- Half-year convention:
  - MACRS counts only 1/2 year depreciation in year 1
    - It assumes you buy halfway through the year!
  - Adds 1/2 year of depreciation in year n+1 to compensate for that
    - It assumes you sell halfway through year n+1
  - That will average out to be about right!
Consider the same machine tool
Assume 7 year MACRS recovery period
# MACRS example (revised)

<table>
<thead>
<tr>
<th>Year</th>
<th>Rate (%)</th>
<th>Deprec.</th>
<th>Book Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td></td>
<td>35,000</td>
<td>Initial 1/2 year</td>
</tr>
<tr>
<td>1</td>
<td>14.3</td>
<td>5005</td>
<td>29,995</td>
</tr>
<tr>
<td>2</td>
<td>24.5</td>
<td>8575</td>
<td>21,420</td>
</tr>
<tr>
<td>3</td>
<td>17.5</td>
<td>6125</td>
<td>15,295</td>
</tr>
<tr>
<td>4</td>
<td>12.5</td>
<td>4375</td>
<td>10,920</td>
</tr>
<tr>
<td>5</td>
<td>8.9</td>
<td>3115</td>
<td>7,805</td>
</tr>
<tr>
<td>6</td>
<td>8.9</td>
<td>3115</td>
<td>4,690</td>
</tr>
<tr>
<td>7</td>
<td>8.9</td>
<td>3115</td>
<td>1,575</td>
</tr>
<tr>
<td>8</td>
<td>4.5</td>
<td>1575</td>
<td>0</td>
</tr>
</tbody>
</table>

Switch to straight line

Final 1/2 year

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MACRS depreciation

- Current approved system in the U.S.
- Switches from declining balance
  - To straight line depreciation
    - (Maximizes present worth of depreciation)
- Assumes zero salvage value
- Assumes only 1/2 year in year 1
  - Adds 1/2 year of depreciation in year n+1
Review

- We learned how to find depreciation by:
  - Straight line method
  - Declining balance balance
    - (especially double declining balance)
  - Modified accelerated cost recovery system
    - (MACRS)
- Next time, we will see how depreciation is used in income tax calculations