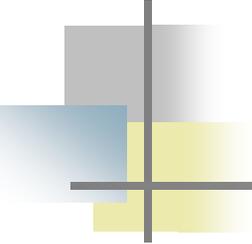# Lecture 14
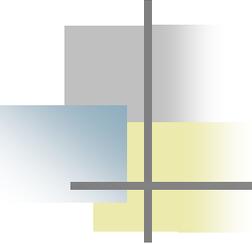
Accounting and Depreciation

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)
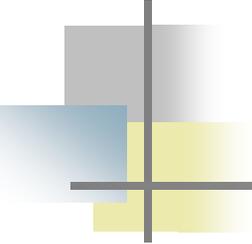
Depreciation

- 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
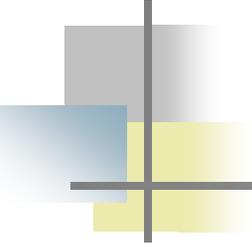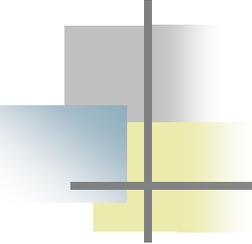
Straight line depreciation

- 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
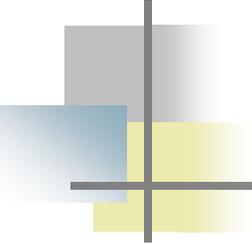
Accelerated depreciation

- 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!*
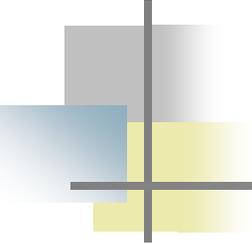
Declining balance depreciation
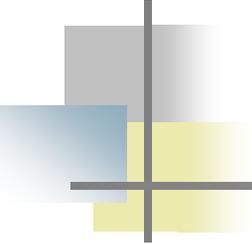
- Recovery period = n
- Depreciation rate = f
  - But applied to book value, *not first cost!*
- Depreciation in period t
  - = f times (book value in period t-1)
    - Decreases each year,
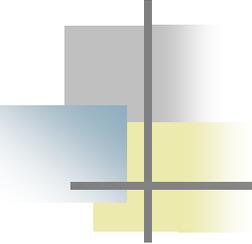   since book value decreases!
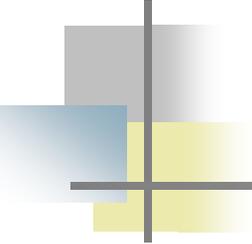
Double declining balance

- Most common form of declining balance is *double* declining balance:
   - f = 2.0/n, where n = recovery period

Declining balance example

- Consider the same machine tool
- f = 2.0/20 years
    - = 10% per year (or .1)
- Depreciation in year 1 = .1 ($35,000)
    - = $3,500 (versus $1,575 for straight line)
- Depreciation in year 2
   - = .1 ($35,000 - $3,500) = $3,150, 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
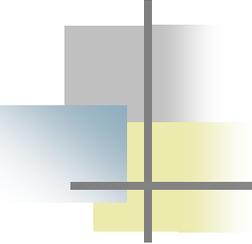
# Declining balance depreciation

- *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
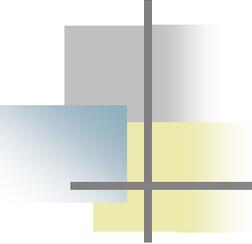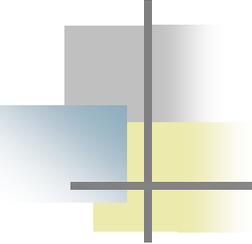
MACRS

- 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)
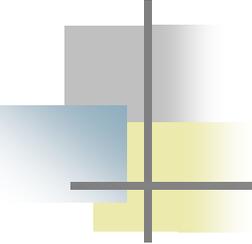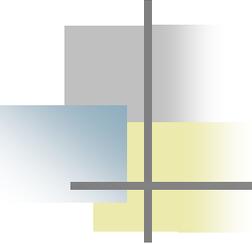
MACRS

- 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
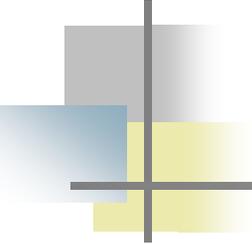
MACRS

- 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!
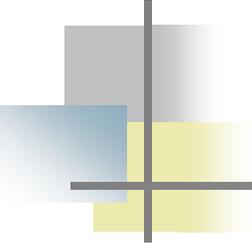
MACRS example

- Consider the same machine tool
- Assume 7 year MACRS recovery period

MACRS example (revised)

Year	Rate (%)	Deprec.	Book Value		
0			35,000	Initial 1/2 year	
1	14.3	5005	29,995		
2	24.5	8575	21,420		
3	17.5	6125	15,295		
4	12.5	4375	10,920		
5	8.9	3115	7,805	Switch to straight line	
6	8.9	3115	4,690		
7	8.9	3115	1,575		
8	4.5	1575	0		
		Final 1/2 year			

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
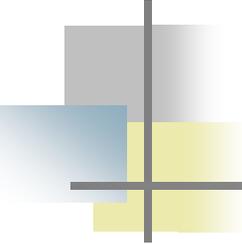
Review

- 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