

# Depreciation

# Goals

- ▶ Reintroduction of the accounting material we left behind after accounting ratios.
- ▶ Use the choice tools with less abstraction and more realism.

## Keep in Mind

This is an area for experts. The IRS puts out new rules and interpretations all the time.

<https://apps.irs.gov/app/picklist/list/internalRevenueBulletins.html>

These are just the cliffs notes version.

- ▶ You may have the basics but what do you do with pistachio trees or when the soil is more than 50% sand and you just did some land prep?
- ▶ Hire an expert.
- ▶ We are here to have an appreciation for what the experts do.

# What is Depreciation

There are a few ways of describing it:

- ▶ The reduction in value of an asset because of the passage of time.
  - ▶ How most people think of depreciation.
  - ▶ Commingles depreciation with price changes in marking asset values to market.
  - ▶ Common definition.
- ▶ A way of allocating the cost of an asset over its useful life.
  - ▶ A better description of what we do.
  - ▶ It is just an algorithm for allocating costs over time.

# The first kind, impairment or mark to market

- ▶ What layperson first thinks of.
- ▶ This is what happens when something drastic happens.
  - ▶ You change the way you use an asset.
  - ▶ Market crash, like real estate
  - ▶ Big changes in asset life.

We will not look at this in class.

## Other Accounting Concepts that Look Like Depreciation

- ▶ Amortization is similar to depreciation but for non-tangible assets like patents, goodwill and the like.
- ▶ Depletion for when you pull sand, oil, gold and lumber out of the ground

(<https://www.irs.gov/publications/p535/ch09.html>)

- ▶ This works much differently than depreciation and amortization.
- ▶ Usually a fraction of other costs or separate estimate per, for example board foot.

# Why Depreciate?

To stop people from making bad decisions because they are not matching costs to benefits.

- ▶ The matching principle, “Report *expenses* in the same period as the related revenues.”
- ▶ Buying an asset is not an expense, you divide up the purchases price over the life of the asset to get the expenses.

Example: The Banner

- ▶ A banner lasts three years.
- ▶ The PEF board ran an auction, allocated the full cost to the first year.
- ▶ They almost didn't have a second year.
- ▶ 2017 was the 14th year.

# What to Depreciate

Assets used for business purposes that have a determinable life of greater than a year that decays, wears away, gets used up, becomes obsolete, or loses value to the owner.

- ▶ Lots of reasons for depreciation of the first type.
- ▶ Keep in mind that short-lived things don't depreciate.
- ▶ Small asset purchases are frequently just treated as an expense.
- ▶ Land . . . mostly not depreciated.



# What Do you Need to Know to Depreciate

- ▶ Cost basis
- ▶ Salvage Value
- ▶ Service Date
- ▶ Service Life
- ▶ Method

## Cost basis

- ▶ Please note that this is not “cost”.
- ▶ Cost basis includes everything you need to get the asset functioning.
  - ▶ Includes transportation.
  - ▶ Includes installation costs.
  - ▶ etc.

Example: Buy a charter sailboat

- ▶ Cost of the boat: 250K
- ▶ Transport it from SFO to PDX: 10K
- ▶ Repairs to electrical: 5K
- ▶ Cost basis: 265K

# Salvage Value

- ▶ This is how much the asset is worth at the end of its *assumed* life.
- ▶ This is an *assumed* value.
- ▶ Yes, *assumed* is used a lot.

# Service Date

- ▶ Date the asset was first able to be used.
  - ▶ Not the day it was used.
  - ▶ Not the day you bought it.
- ▶ Example: Buy a rental house on January 5th.
  - ▶ Can't rent it out because the roof was shot.
  - ▶ The roof is fixed on April 1st.
  - ▶ First rented on May 1st.

The service date is April 1st, when it is able to be used.

# Service Life

How long an asset will last before it will be salvaged.

- ▶ This does not mean it is non-functional – it could be.
- ▶ It could also be obsolete.

How long?

- ▶ Back in the day the IRS would have a case to determine how long an asset lasted for tax purposes.
- ▶ These days they have tables (<https://www.irs.gov/publications/p946/ar02.html#d0e10880>) table B-2 and below.

# Method

It is easiest to think of method as a formula to allocate the reduction in value from cost basis to salvage value over the life of the asset.

The common approaches are:

- ▶ Straight line
- ▶ Declining balance methods.

## Key Term: Book Value

- ▶ Depreciation: Reduction in value each year.
- ▶ Book Value: Cost basis less accumulated depreciation.

# Straight Line Depreciation

$$D_t = \frac{\text{Cost Basis} - \text{Salvage}}{\text{Life}}$$

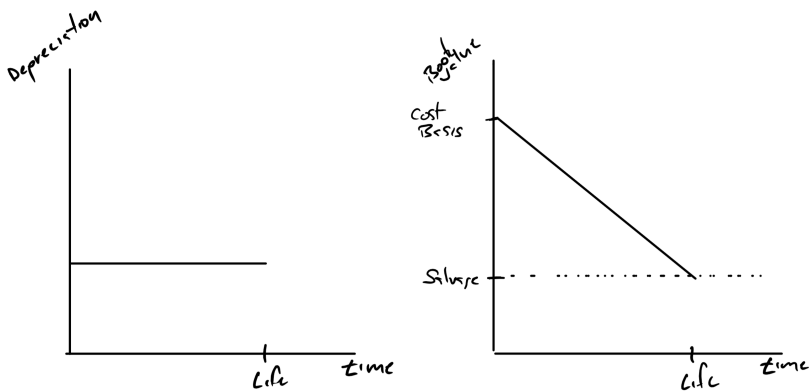


Figure 1



## Straight Line Tabular Example

Five-year asset with cost basis of 11K and Salvage of 1K.

Year	Depreciation	Book Value
1	2K	9K
2	2K	7K
3	2K	5K
4	2K	3K
5	2K	1K

# Accelerated Depreciation

Just means more depreciation earlier.

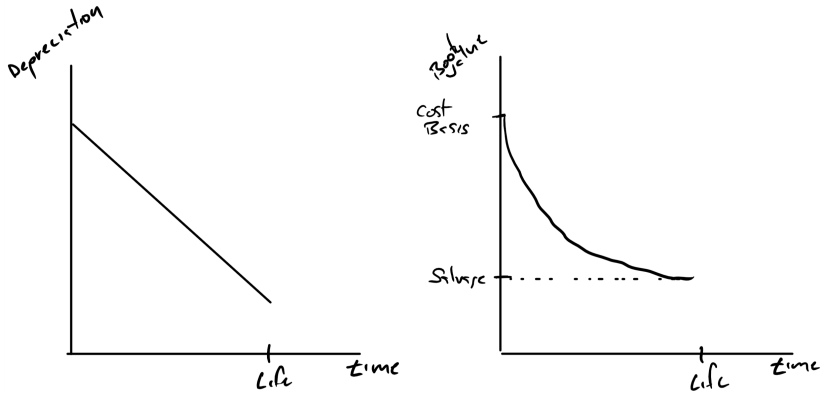


Figure 2

## Declining Balance Depreciation (A Kind of Accelerated)

$$D_t = B_{t-1} \frac{1}{Life}$$

Year	Depreciation	Book Value
1	$\frac{11K}{5} = 2.2K$	8.8K
2	$\frac{8.8K}{5} = 1.76K$	7.04K
3	$\frac{7.04K}{5} = 1.408K$	0.352K
4	$\frac{0.352K}{5} = 0.0704K$	0.2816K
5	$\frac{0.2816K}{5} = 0.05632K$	0.22528K

Note that Salvage Value is not in the equation. You need to modify this to reach the salvage value

## Variants Double Declining Balance etc.

$$D_t = B_{t-1} \frac{2}{Life}$$

Year	Depreciation	Book Value
1	$11K \frac{2}{5} = 4.4K$	6.6K
2	$6.6K \frac{2}{5} = 2.64K$	3.96K
3	$3.96K \frac{2}{5} = 1.584K$	1.056K
4	$1.056K \frac{2}{5} = 0.4224K$	0.6336K
5	$0.6336K \frac{2}{5} = 0.25344K$	0.38016K

## One way to hit salvage value

If Declining balance would take the book value below the salvage value before the end of the service life. Stop when you get to the salvage value. Example with Salvage of 1K.

Year	Depreciation	Book Value
1	$\frac{11K}{5} = 4.4K$	6.6K
2	$\frac{6.6K}{5} = 2.64K$	3.96K
3	2.96K	1K
4	0K	1K
5	0K	1K

## How DB uses Straight Line.

We are not going to do this in class. We will focus on tax depreciation through the Modified Accelerated Cost Recovery System (*MACRS*)

If declining balance will not get you to salvage value, you switch to straight line from declining balance when straight line depreciation – at current book value and remaining life – is greater than declining balance declining balance depreciation.

# Book vs Tax Depreciation

- ▶ Yes, accountants do depreciation many ways.
- ▶ There are two sets of books, one for tax purposes and one for use internally and by the financial markets.
- ▶ This is not like coded accounts where “Produce” is actually an account for bribes.

# Why Two Sets of Books

- ▶ Accountants have two objectives:
  - ▶ Accurately convey the state of the business.
  - ▶ Minimize taxes.
- ▶ They can't achieve both at the same time:
  - ▶ IRS says a car lasts 5 years.
  - ▶ You know it will last 15.
  - ▶ Either pay more taxes or give bad information to shareholders and management.

The solution is two sets of books.



# In Class

- ▶ We will focus on depreciation for tax purposes
- ▶ We will pretend that book depreciation and tax depreciation are the same.
- ▶ They rarely are.

# MACRS

- ▶ Assumed salvage value is zero.
  - ▶ Gives advantage of more early depreciation.
  - ▶ Considered an investment stimulus.
  - ▶ We true up with “depreciation recapture” at sale
- ▶ Lives are given by table.
  - ▶ Lives are typically shorter than reality.
  - ▶ Again, tax advantageous.
  - ▶ Only a few categories
- ▶ Method is one of the declining balance methods
  - ▶ Salvage value of zero makes uniform tables possible.
  - ▶ Simplifies the depreciation calculations.

Depreciation recapture and gains taxes are in a later set of slides.

# A Note on Time Conventions

There are three:

- ▶ Mid-year: Assets that are not real estate.
- ▶ Mid-Month: Structures
- ▶ Mid-Quarter: Alternative for assets that are not real estate.

Mid-year:

- ▶ No matter when you buy the asset, Jan 1 or Dec 1, get a half a year of depreciation.
- ▶ No matter when you sell the asset, get half a year.

# Why the time conventions

- ▶ They keep the buyer and the seller from fighting over the service date for tax purposes.
  - ▶ Advantage to seller to have a later date.
  - ▶ Advantage to buyer to have an earlier date.
- ▶ Real estate is strange and big.
- ▶ Mid-quarter is there to keep exploiting the obvious tax savings of buying lots of assets at the end of the year and getting half a year of depreciation.

## Mid-Quarter Convention

- ▶ No matter when you buy or sell the asset in a quarter, you get half a quarter of depreciation.
- ▶ If you purchase too many assets in the last quarter of the year, they automatically convert to mid-quarter.
  - ▶ If you purchase too many, say 5-year assets, at the end of the year you get 1.5 months of depreciation rather than 6 months.
  - ▶ You can elect to depreciate assets on a mid-quarter basis.
- ▶ Why elect?
  - ▶ You know what quarter you will sell the asset.
  - ▶ Buy in first quarter of a year and sell in the last quarter of the next.
  - ▶ Mid-quarter gives more depreciation (21 months) than mid-year (12 Months).

We will not do mid-quarter in class.

## Mid-Month

Used only for real estate.

- ▶ No matter when you buy the property in a month, you get half a month of depreciation for that month.
- ▶ Buy a rental home in Feb, get 10.5 months of depreciation.
- ▶ Sell a rental home in Feb, get 1.5 months of depreciation.
- ▶ Note that only the structure, not the land, depreciates.

Real property is usually 27.5 years, for residential, or 39 years, for commercial, property but it gets complicated fast. *We don't do this in class.*

# Warnings

- ▶ Depreciation get complicated fast.
  - ▶ What happens if you make some major modifications to an asset which extends its life?
  - ▶ What if you add a new roof to a fully depreciated structure?
- ▶ Hire a pro to handle this.
- ▶ What we will do in class
  - ▶ Asset purchases and sale.
  - ▶ No modifications to asset life or value, marking to market.
  - ▶ No reductions in value that are not-depreciation.
  - ▶ Assume book depreciation and tax depreciation are the same.
  - ▶ Nothing agricultural.
  - ▶ *Later* very simple tax treatment.

# How To Depreciate Under MACRS (Step 1)

- ▶ Identify the asset class of what you are depreciating.
- ▶ There are tables for this.
  - ▶ Table B2 <https://www.irs.gov/publications/p946/ar02.html#d0e10880>
  - ▶ You want GDS.
  - ▶ ADS is agricultural.
- ▶ Some of this is strange. Check out the nuclear train. <https://www.irs.gov/publications/p946/13081f37.html>
- ▶ Each industry tends to have its own section with common asset lives.
- ▶ Short lives
  - ▶ By design as a tax break.
  - ▶ Assets that last between 10-15 years tend to be 7 year assets and so on.



## For questions

- ▶ I tend to give either a description of an asset with an asset class, i.e, “Depreciate the barge, a 10-year asset.”
- ▶ Or, give something common, like a car, which is a 5-year asset.
- ▶ You can find a full mid-year convention table here  
<http://ec314-pdx-edu.wikidot.com/macrs>

## The Tables (Subset Shown)

Year	Class	3	5	7
1		33.33	20.00	14.29
2		44.45	32.00	24.49
3		14.81*	19.20	17.49
4		7.41	11.52*	12.49
5			11.52	8.93*
6			5.76	8.92
7				8.93
8				4.46

- ▶ Values in the table are the percent of cost basis to take as depreciation that year.
- ▶ Half-year convention is built in. First and last years are half years.
- ▶ Time convention is different from TVM. “Now” is year 1, not year 0

## The Tables (Con't)

Year	Class	3	5	7
1		33.33	20.00	14.29
2		44.45	32.00	24.49
3		14.81*	19.20	17.49
4		7.41	11.52*	12.49
5			11.52	8.93*
6			5.76	8.92
7				8.93
8				4.46

- ▶ Salvage is zero. The percent depreciation adds to 100%.
- ▶ The “\*” indicates when the double declining balance switched to straight line. Interesting but useless.

## Depreciate an Asset (Hold till the end)

10K, 5-year asset.

Table 7

Year	MACRS	Depreciation	BookValue
1	0.200	2,000	8,000
2	0.320	3,200	4,800
3	0.192	1,920	2,880
4	0.115	1,152	1,728
5	0.115	1,152	576
6	0.058	576	0

## Sell the asset in year 4

Get half the usual depreciation in the year of sale. Literally, divide by 2, no matter what year, even year 6 of a five-year asset.

Table 8

Year	MACRS	Depreciation	BookValue
1	0.200	2,000	8,000
2	0.320	3,200	4,800
3	0.192	1,920	2,880
4	0.058	576	2,304

The person that bought it starts with a new cost basis back at year 1.

## Keep in Mind

- ▶ In real life, you will use straight line for financial purposes.
- ▶ This material, with the tables, is for tax depreciation.
- ▶ Keep it simple, *Number in table \* Cost basis*
- ▶ Dealing with the tax consequence of selling the asset for something other than book value will be addressed later once we hit taxes.