

## Brief Depreciation and Taxes

# 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](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.

# 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/pub/irs-pdf/p946.pdf>) table B-1 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.

# 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.

# 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.
- ▶ 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 3

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 4

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.

# Tax Goals

- ▶ Simplified Introduction to taxes
- ▶ Depreciation recapture when assets are sold for other than book value.
- ▶ Effects of taxes on incentives to replace assets.
- ▶ Effects of taxes on incentives to borrow money.

## Taxes are a specialist area

- ▶ The statutes (US Code) <http://uscode.house.gov/browse/prelim@title26&edition=prelim>
- ▶ The regulations (US CFRs) [https://www.ecfr.gov/cgi-bin/text-idx?SID=53e8b2eb097e4352766122db08d0c572&mc=true&tpl=/ecfrbrowse/Title26/26tab\\_02.tpl](https://www.ecfr.gov/cgi-bin/text-idx?SID=53e8b2eb097e4352766122db08d0c572&mc=true&tpl=/ecfrbrowse/Title26/26tab_02.tpl)
- ▶ There is also a mass of case law on taxes.

We take a simplified approach that is appropriate for first pass estimate of cash flow. In real life, that one box takes as much effort as revenue and cost estimates.

## In this class

We will treat taxes as a simple percent.

- ▶ Clearly, we are hiding a lot of complexity.
- ▶ What we are doing is the equivalent of making “rough cash flow estimate”.
  - ▶ Semi-rough and Detailed are much more work.
  - ▶ For those, the economists, engineers and MBA types will work separately in specialist areas and then assemble at the end.

In this class:

- ▶ You will be given a rate, e.g., 35%. Like asking accounting what assumed rate to use.
- ▶ Use a rule of thumb rate, i.e, 40% or 50%. Covers most income correlated taxes.
- ▶ Separate Federal and Corporate Taxes, that you turn into a combined tax rate.

## Combined Tax Rate (c)

This looks funny because state taxes ( $s$ ) are an expense on federal taxes ( $f$ ) and federal is an expense on state.

$$(1 - s)(1 - f) = (1 - c)$$

$$1 - s - f + sf = (1 - c)$$

$$c = s + f - sf$$

This may be outdated next week.

# Tax Incentives to Replace Assets

- ▶ Only business have depreciation expenses
- ▶ Only business see decreases in taxes because they buy assets.
- ▶ They have greater financial incentives to replace existing assets than households do.

This may all change next week.



## Recall the Depreciation of a Car we did before

Table 5

Year	Personal	Depreciation
1	-10,000	2,000
2	0	3,200
3	0	1,920
4	0	1,152
5	0	1,152
6	0	576

## Add Taxes

Depreciation is an expense, which reduces taxable income and taxes.  
Assume a 40% combined tax rate.

Table 6

Year	Personal	Depreciation	TaxSave	AfterTax
1	-10,000	2,000	800	-9,200
2	0	3,200	1,280	1,280
3	0	1,920	768	768
4	0	1,152	461	461
5	0	1,152	461	461
6	0	576	230	230

Businesses have lower negative cash flow at purchase and positive thereafter.

# Interpretation

Suppose you were deciding to replace an existing car with a new one that had the same, maintenance, fuel and other costs.

- ▶ From a personal finance point of view, you would need to find \$10,000 in non-financial benefits, e.g., a sunroof, to justify replacing it.
- ▶ From a business point of view you only need,  
 $PW(AfterTax|MARR = 10\%) = \$6,597.65$

This is why you often have newer equipment on the job site than at home.

# Tax Incentives to Borrow

- ▶ With a few exceptions, i.e., mortgage and student loans, only business reduce taxable income with interest expenses.
- ▶ They have greater financial incentives to borrow money than households do.

## Consider the Following Loan

Table 7

Time	Payment	Interest	Principal	Balance
0	0	0	0	10,000
1	2,638	1,000	1,638	8,362
2	2,638	836	1,802	6,560
3	2,638	656	1,982	4,578
4	2,638	458	2,180	2,398
5	2,638	240	2,398	0

A household would look at the PW of the payments to evaluate if it was a good loan for them.

## Business Point of View

Table 8

Time	Payment	Interest	TaxSavings	AfterTax
0	0	0	0	0
1	2,638	1,000	400	2,238
2	2,638	836	334	2,303
3	2,638	656	262	2,376
4	2,638	458	183	2,455
5	2,638	240	96	2,542

See the advantage?

# Businesses will Borrow When Individuals would not

The tax advantages mean that businesses will often borrow at a higher rate than MARR.

- ▶ MARR can be thought of as an after tax interest rate.
- ▶ Interest on loans is pre-tax for businesses.
- ▶ Quick rule of thumb if  $Loan\ Rate(1 - c) < MARR$ , take the loan
  - ▶ Approximation only works with moderate interest rates
  - ▶ Longish loan periods.

# Summary of Incentives

Because businesses have ways of reducing taxable income that households do not, they do things differently than households.

- ▶ Asset replacement
  - ▶ Households have a bigger leap to warrant replacement.
  - ▶ Because households can't take depreciation expenses off of taxable income.
- ▶ Loans
  - ▶ Households tolerate lower interest rates on loans
  - ▶ Because households can't take interest expense off taxable income.



## Back to How Depreciation Works

- ▶ Remember we never addressed what happens when you sell an asset for something other than book value?
- ▶ There is a process of truing up called, “depreciation recapture” that results in a gains tax.

### Warnings:

- ▶ There is a different treatment for different kinds of gains in personal taxes
  - ▶ Ordinary Gains – Selling asset for more than book value but less than cost basis.
  - ▶ Capital Gains – Selling asset for more than cost basis.
  - ▶ Long-term Capital – Selling asset for more than cost basis but after more than a year.
- ▶ We only handle corporate taxes here, where the rates are all the same. Consult a financial planner for personal.

# Business Income Taxes

Business taxes tend to be “trued up” over time.

- ▶ If you run a loss one year, you can get some of the taxes you paid in previous years back.
- ▶ If you run a big enough loss, you can get all the taxes back for the last few years and use the rest to reduce future taxes. Rules are detailed.
- ▶ Ordinary and Capital losses are treated differently. There are differences on what losses can be applied to and for how long.

Similar truing up is done with assets sold for something other than book value.

- ▶ Treated as ordinary gains and is taxed.
- ▶ Warning, technical area.
- ▶ I show basics for beginners.

## Return of the Car

Same as before with 40% tax rate.

Table 9

Year	Personal	Depreciation	TaxSave	AfterTax
1	-10,000	2,000	800	-9,200
2	0	3,200	1,280	1,280
3	0	1,920	768	768
4	0	1,152	461	461
5	0	1,152	461	461
6	0	576	230	230

Book value is zero in time 7. We are going to sell it for \$1,000 in time 7.

## Sell it for \$1,000 in period 7

Book Value was zero so \$1,000 is more than the zero book value and you must pay 40% tax on the gain.

Table 10

Year	Personal	AfterTax	GainsTax	NetCash
1	-10,000	-9,200	0	-9,200
2	0	1,280	0	1,280
3	0	768	0	768
4	0	461	0	461
5	0	461	0	461
6	0	230	0	230
7	1,000	1,000	400	600

## Try Selling for Other than Book Value in time 4

Table 11

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

Aim for for sale for more than book value, \$5,000, and less than book value, \$1,000.

Sell for \$5,000, i.e., more than book

Table 12

Year	Depreciation	BookValue	PreTax
1	2,000	8,000	-10,000
2	3,200	4,800	0
3	1,920	2,880	0
4	576	2,304	5,000

$$\text{Gains Tax} = (\text{Salvage} - \text{Book Value}) \text{Tax Rate}$$

## Net Cash Flow With Gains Tax

Table 13

Year	PreTax	AfterTax	GainsTax	NetCash
1	-10,000	-9,200	0	-9,200
2	0	1,280	0	1,280
3	0	768	0	768
4	5,000	5,230.400	1,078.400	4,152

You pay tax when you sell for more than book value.

Sell for \$1,000, i.e., less than book

Table 14

Year	Depreciation	BookValue	PreTax
1	2,000	8,000	-10,000
2	3,200	4,800	0
3	1,920	2,880	0
4	576	2,304	1,000

$$\text{Gains Tax} = (\text{Salvage} - \text{Book Value}) \text{Tax Rate}$$



## Net Cash Flow With Gains Tax

Table 15

Year	PreTax	AfterTax	GainsTax	NetCash
1	-10,000	-9,200	0	-9,200
2	0	1,280	0	1,280
3	0	768	0	768
4	1,000	1,230.400	-521.600	1,752

You get money back when you sell for less than book value.

## A View on Gains Tax

- ▶ You will have an undiscounted sum of tax savings equal to the the difference between the cost basis and actual salvage value.
- ▶ Understatement of depreciation, almost always the case, give business a zero interest loan from the government.
- ▶ Overstatement, give the government a zero interest loan from the business.

# Summary

- ▶ Very simple treatment of tax effects
- ▶ Expert area but you know enough for a rough cash flow projection.
- ▶ Effects:
  - ▶ More likely to replace
  - ▶ More likely to borrow
- ▶ Next we will put all this information into a form that others can read and understand, Income/Cash Flow form.