

FIN2010 Financial Management

Estimate Cash Flows II



Agenda

- Discussion of depreciation
- More examples



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Depreciation-net effect

- Depreciation is a non-cash expense. However it changes the taxes a firm needs to pay because it enters into the calculation of taxable income

- Remember:

$$\begin{aligned} \text{FCF}_t = & (\text{revenues}_t - \text{costs}_t - \text{depreciation}_t) * (1 - \tau_c) \\ & + \text{depreciation}_t - \text{capital expenditure}_t - \Delta\text{NWC}_t \end{aligned}$$

- The effect of depreciation on cash flow:

$$- \text{Depreciation} * (1 - \tau_c) + \text{depreciation} = \text{Depreciation} * \text{tax rate}$$

- This is called the depreciation tax shield

- Depreciation tax shield only works when firms have positive EBIT before depreciation.

- Question to think about: do you want to depreciate a fixed asset faster or slower in order to maximize project NPV?

- Generally faster, except when earning < 0



Alternative Depreciation Method

Besides straight-line depreciation, a typical accounting standard may also allow for alternative depreciation method such as double declining depreciation method.

- An example from the US MARCS (modified accelerated cost recovery system) is shown on the left.
 - Accounting rules will also specify which recovery period a certain type of assets can should follow.
 - For each recovery period, depreciation rates over time are specified. These rates are calculated according to preset formulas, which we skip here.

Year	Depreciation Rate for Recovery Period					
	3 Years	5 Years	7 Years	10 Years	15 Years	20 Years
1	33.33	20.00	14.29	10.00	5.00	3.750
2	44.45	32.00	24.49	18.00	9.50	7.219
3	14.81	19.20	17.49	14.40	8.55	6.677
4	7.41	11.52	12.49	11.52	7.70	6.177
5		11.52	8.93	9.22	6.93	5.713
6		5.76	8.92	7.37	6.23	5.285
7			8.93	6.55	5.90	4.888
8			4.46	6.55	5.90	4.522
9				6.56	5.91	4.462
10				6.55	5.90	4.461
11				3.28	5.91	4.462
12					5.90	4.461
13					5.91	4.462
14					5.90	4.461
15					5.91	4.462
16					2.95	4.461
17						4.462
18						4.461
19						4.462
20						4.461
21						2.231



Example- Double declining depreciation method

Assume that Linksys would use the Double declining depreciation method. Assume the MACRS allows a life of 3-year for this asset.

	Year	0	1	2	3	4	5
Incremental Earnings Forecast							
	Sales		23500	23500	23500	23500	
-	Cost of goods sold		9500	9500	9500	9500	
=	Gross profit		14000	14000	14000	14000	
-	Selling, general, and administrative		3000	3000	3000	3000	
-	Research and development	15000					
-	Depreciation		2500	3334	1111	556	
=	EBIT	(15000)	8500	7666	9889	10444	0
-	Income Tax at 40%	(6000)	3400	3067	3956	4178	0
=	Unlevered Net Income	(9000)	5100	4600	5934	6267	0
Free Cash Flow(\$thousands)							
+	Depreciation		2500	3334	1111	556	
-	Capital Expenditures	7500					
+	Adjustment for salvage value						12
-	Change in NWC		2100	0	0	0	(2100)
=	Free Cash Flow	(16500)	5500	7934	7044	6822	2112
	PV of free cash flow @12%	(\$16,500)	\$4,911	\$6,325	\$5,014	\$4,336	\$1,198
	NPV	\$5,283					

7,500,000*33%

7,500,000*44.45%



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More examples #1

- We have simplified the example by assuming the revenue and costs are constant over time.
- In the real world, the estimates of these revenues and costs are likely to be much more complicated.
- Typically,
 - Sales will change from year to year.
 - The average selling price will vary over time
 - The average cost per unit will change over time.



More examples #1

- Suppose sales of HomeNets were expected to be 100,000 units in year 1, 125,000 units in year 2 and 3, and 50,000 units in year 4. By contrast, selling, general, and administrative expenses are expected to rise with inflation by 4% per year.

	Year	0	1	2	3	4	5
Incremental Earnings Forecast							
	Sales		23500	29375	29375	11750	
-	Cost of goods sold		9500	11875	11875	4750	
=	Gross profit		14000	17500	17500	7000	
-	Selling, general, and administrative		3000	3120	3245	3375	
-	Research and development	15000					
-	Depreciation		2500	3334	1111	556	
=	EBIT	(15000)	8500	11046	13144	3070	
-	Income Tax at 40%	(6000)	3400	4419	5258	1228	
=	Unlevered Net Income	(9000)	5100	6628	7887	1842	
Free Cash Flow(\$thousands)							
+	Depreciation		2500	3334	1111	556	
-	Capital Expenditures	7500					
+	Adjustment for salvage value						12
-	Change in NWC		2100	0	0	0	(2100)
=	Free Cash Flow	(16500)	5500	9962	8997	2398	2112
	PV of free cash flow @12%	(\$16,500)	\$4,911	\$7,941	\$6,404	\$1,524	\$1,198
	NPV	\$5,478					

125,000*\$260-
125,000*25%*\$100.
Remember HomeNets has
an project externalities on
existing router.

125,000*\$110-
125,000*25%*\$60.
Remember HomeNets has
an project externalities on
existing router.



More examples #2- buy new asset

- Basket Wonders (BW) is considering the purchase of a new basket weaving machine.
- The machine will cost \$50,000 plus \$20,000 for shipping and installation and falls under the 3-year MACRS class.
- Net working capital will rise by \$5,000 right away, and fall to 0 by the end of year 4.
- Lisa Miller forecasts that revenues will increase by \$110,000 for each of the next 4 years and will then be sold (scrapped) for \$10,000 at the end of the fourth year, when the project ends. Costs of good sold will rise by \$70,000 for each of the next four years.
- BW is in the 40% tax bracket.
- What are the incremental cash flows from year 0 to year 4?



More examples #2-revenue and costs

	Year	0	1	2	3	4
Incremental Earnings Forecast (\$thousands)						
	Sales		110000	110000	110000	110000
-	Cost of goods sold		70000	70000	70000	70000
=	Gross profit		40000	40000	40000	40000
-	Selling, general, and administrative					
-	Research and development					
-	Depreciation					
=	EBIT					
-	Income Tax at 40%					
=	Unlevered Net Income					
Free Cash Flow(\$thousands)						
+	Depreciation					
-	Capital Expenditures					
+	Adjustment for salvage value					
-	Change in NWC					
=	Free Cash Flow					



More examples #2 – CAPEX & Depr.

- Capital expenditure = 50,000+20,000=70,000
- Depreciation₁=70,000*33.33%=\$23,331
- Depreciation₂=...

Year	0	1	2	3	4
Depreciation		23331	31115	10367	5187

	Year	0	1	2	3	4
Incremental Earnings Forecast (\$thousands)						
	Sales		110000	110000	110000	110000
-	Cost of goods sold		70000	70000	70000	70000
=	Gross profit		40000	40000	40000	40000
-	Selling, general, and administrative		0	0	0	0
-	Research and development					
-	Depreciation		23331	31115	10367	5187
=	EBIT	0	16669	8885	29633	34813
-	Income Tax at 40%	0	6668	3554	11853	13925
=	Unlevered Net Income	0	10001	5331	17780	20888
Free Cash Flow(\$thousands)						
+	Depreciation		23331	31115	10367	5187
-	Capital Expenditures	70000				
+	Adjustment for salvage value					
-	Change in NWC					
=	Free Cash Flow					

More examples #2 - asset disposal

- Cash flow from the asset disposal
- Sale price=\$10,000
- Book value=\$70,000-cumulative depreciation=\$0
- Capital gain from the sale=\$10,000-0=\$10,000
- Taxes=\$10,000*40%=4,000
- Cash flow from the asset disposal=\$10,000-4,000=\$6,000



More examples #2—ICF

	Year	0	1	2	3	4
Incremental Earnings Forecast (\$thousands)						
	Sales		110000	110000	110000	110000
-	Cost of goods sold		70000	70000	70000	70000
=	Gross profit		40000	40000	40000	40000
-	Selling, general, and administrative		0	0	0	0
-	Research and development					
-	Depreciation		23331	31115	10367	5187
=	EBIT	0	16669	8885	29633	34813
-	Income Tax at 40%	0	6668	3554	11853	13925
=	Unlevered Net Income	0	10001	5331	17780	20888
Free Cash Flow(\$thousands)						
+	Depreciation		23331	31115	10367	5187
-	Capital Expenditures	70000				
+	Adjustment for salvage value					6000
-	Change in NWC	5000				-5000
=	Free Cash Flow	(75000)	33332	36446	28147	37075

Net working capital will rise by \$5,000.

Initial
ICF

Interim
ICF

Terminal year ICF



More example #3 - an asset replacement project

- Let us assume that previous asset expansion project is actually an asset replacement project.
- The original cost of the machine was \$30,000 and depreciated using straight-line over five years (\$6,000 per year).
- The machine has been used for three years, and it is projected to serve for another four years. If the firm sell the machine now, the price is expected to be \$6,000.
- The new machine will not increase revenues (remain at \$110,000) but it decreases production costs by \$10,000 per year (old = \$80,000).
- NWC will rise to \$10,000 from \$5,000 in year 0.



More example #3

- Easy to fill in sales, cost of goods sold, changes in NWC.

	Year	0	1	2	3	4
Incremental Earnings Forecast (\$thousands)						
	Sales		0	0	0	0
-	Cost of goods sold		(10000)	(10000)	(10000)	(10000)
=	Gross profit		10000	10000	10000	10000
-	Selling, general, and administrative					
-	Research and development					
-	Depreciation		?	?	?	?
=	EBIT					
-	Income Tax at 40%					
=	Unlevered Net Income					
Free Cash Flow(\$thousands)						
+	Depreciation		?	?	?	?
-	Capital Expenditures	?				
+	Adjustment for salvage value	?				?
-	Change in NWC	5000				-5000
=	Free Cash Flow					

- What about incremental depreciation, capital expenditure, salvage value?

More example #3

- The old machine uses five years depreciation. So if we continue to use it, it will have two more years of depreciation.
- If the firm buys new asset, it can sell the current asset for \$6,000.
 - Sale price=\$6,000
 - Book value= $30,000 - 3 \times 6,000 = 12,000$
 - Capital gain/loss= $6,000 - 12,000 = -6,000$
 - Tax saving from the loss= $6,000 \times 40\% = 2,400$
 - Total cash flow from the sale= $6,000 + 2,400 = 8,400$

w/o the asset replacement					
Depreciation		6000	6000	0	0
Capital Expenditures					
Adjustment for salvage value					
w/ the asset replacement					
Depreciation		23331	31115	10367	5187
Capital Expenditures	70000				
Adjustment for salvage value	8400				6000
Incremental depreciation(w/-w/o)		17331	25115	10367	5187
Incremental capital expenditure (w/-w/o)	70000	0	0	0	0
Incremental adjustment for salvage value (w/-w/o)	8400	0	0	0	6000

More example #3—ICF

Incremental Earnings Forecast (\$thousands)						
	Sales		0	0	0	0
-	Cost of goods sold		(10000)	(10000)	(10000)	(10000)
=	Gross profit		10000	10000	10000	10000
-	Selling, general, and administrative					
-	Research and development					
-	Depreciation		17331	25115	10367	5187
=	EBIT	0	(7331)	(15115)	(367)	4813
-	Income Tax at 40%		(2932)	(6046)	(147)	1925
=	Unlevered Net Income		(4399)	(9069)	(220)	2888
Free Cash Flow(\$thousands)						
+	Depreciation		17331	25115	10367	5187
-	Capital Expenditures	70000				0
+	Adjustment for salvage value	8400				6000
-	Change in NWC	5000				-5000
=	Free Cash Flow	(66600)	12932	16046	10147	19075



Summary

- Depreciation tax shield = depreciation * tax rate
 - Only offers tax savings against positive EBIT
 - Straight-line and double declining method
 - Understand how it impacts project value
- More examples on incremental cash flows
- Group project: conduct free cash flow analysis on an investment project
 - Justify your numbers!

