Suggested Problem Solutions
Investment Valuation – Damodaran

Lecture 3 – Estimating Earnings and Forecasting Cash Flows

CHAPTER 9 – MEASURING EARNINGS

1. Operating Lease Expenses:

Year	Lease Commitments ($ millions)	Present Value ($ millions)
1	$90 m	$84.112 m
2	$90 m	$78.609 m
3	$85 m	$69.385 m
4	$80 m	$61.032 m
5	$80 m	$57.039 m
6-10	$75 m/yr	$219.254 m
Debt Value of Leases =		$569.431 m

The debt value of operating leases is $569.431 million. Including this amount in debt, the book value debt to equity ratio becomes 569/1000 or 0.5694

2. If EBIT (with operating leases expensed) equals $200 million, and we wish to capitalize operating leases and compute adjusted operating income, we need to make an assumption regarding the depreciation on the asset created by the operating lease capitalization. A convenient assumption is that the interest expense equals the difference between the actual operating lease payment and the depreciation on the asset. Hence the total amount of the actual lease payment is still expensed in net income, part of it as an operating expense (depreciation) and part of it as a financing expense. So, while operating income must be adjusted for the reclassification of operating leases, net income is unaffected.

   We discussed two methods of adjusting operating income. In the first, we add back the operating lease expense and instead subtract the assumed depreciation on the operating lease asset. If we assume straight line depreciation over the 10-year life of the operating leases, the depreciation would be $569.431/10= $56.943. The adjusted operating income would then equal:
   $200 + $85 – $56.943 = $228.057 million.

   Using the second method for adjusting operating income, we add back only the imputed interest payment on the operating lease debt, which would be 7% of the value of the capitalized operating leases. This equals 569.431 x .07 = $39.86 million. Adjusted operating income then equals:
   $200 + $39.86 = $239.86 million.

   Note: A possible variation on this estimation method would be to estimate the imputed interest based on the value of capitalized operating leases *as of one year ago*. Problem 1 states that the most recent

year's operating lease payment was $85 million. The present value of operating leases *one year ago* would have been (85/1.07) + (569.431/1.07) = $611.62 million. The revised estimate of the imputed interest payment would then equal seven percent of this, or $42.81 million. Adjusted operating income in this case equals 200 + 42.81 = $242.81 million.

3. If the book value of capital is $1 billion and the reported debt to capital ratio is 10%, the book value of debt equals $100 million. If the present value of lease commitments is $750 million, the revised debt to capital ratio is (100+750)/(1000+750) = 48.57%. The after-tax return on capital would equal 0.25x1000/1750 = 14.29%. However, this ignores the effect of the operating lease adjustment on after-tax operating income.

   If we assume the after-tax operating income prior to the operating lease adjustment equals 25% x $1 billion, we get $250 million. To adjust for operating leases, we can add back the after-tax value of imputed interest on the operating lease debt. Assuming a tax rate of 40%, the after-tax value of the imputed interest would be ($750 million x 8%)(1-0.4) = $36 million. The adjusted return on capital would then equal: (250 + 36)/(1750) = 16.34%.

4. R&D Expenses

Year	R&D Expense	Current Year Amortization	Unamortized Amount Remaining in Current Year	
-5	50.0	10.0	0%	0.0
-4	60.0	12.0	20%	12.0
-3	70.0	14.0	40%	28.0
-2	80.0	16.0	60%	48.0
-1	90.0	18.0	80%	72.0
Current Year	100.0	0.0	100%	100.0
Total		70.0		260.0

   Note: I am assuming that the current year's R&D expense will not be amortized this year.

   a. The value of the research asset equals $260 million.
   b. The amount of R&D amortization this year is $70 million.
   c. The adjustment to operating income is to increase it by 100-70 or $30 m. (We add back the original R&D expense of $100m and subtract the amortization of R&D of $70m.)

5. Capital Invested is $1500 million. The value of the research asset is $1000 million. Hence the adjusted value of capital invested is $2500 million. EBIT(1-t) originally calculated was $1500 million (100% of 1500). Adjusted EBIT(1-t) equals 1500 +250 –150 = $1600 million. The revised return on capital is then 1600/2500 = 64%.

   Note that neither the R&D expense nor the R&D amortization are multiplied by (1-T) when adjusting after-tax operating income. This differs from the operating lease adjustment to after-tax operating income.

CHAPTER 10 – FROM EARNINGS TO CASH FLOWS

2.

Year	R&D Expense	Current Year Amortization	Unamortized Amount Remaining in Current Year	
-3	20.0	6.7	0.0%	0.0
-2	30.0	10.0	33.3%	10.0
-1	40.0	13.3	66.7%	26.7
Current Year	50.0	0.0	100.0%	50.0
Total		30.0		86.7

Value of research asset $86.67
Amortization = $30.00
Adjusted Operating Income = 80 (1-.4) + 50 - 30 = $68.00

*Again, note that the R&D expense and R&D amortization are not multiplied by (1-T) in the adjustment to after-tax operating income. This differs from the operating lease adjustment described in problem 3 below.

Free Cash Flow to the Firm Equals:
Adjusted Operating Income = $68.00
- Cap Ex = $160.00 (includes R&D and acquisitions)
+ Depreciation & Amortization = $50.00 (includes amortization of R&D)
Free Cash flow to Firm = -$42.00

3. PV of Operating Lease Commitments =$310.49

$$50\left(\frac{1-(1.06)^{-8}}{.06}\right) = \$310.49m$$

To adjust operating income, add back the imputed interest payment on the operating lease debt.
Adjusted EBIT = 60 + (310.49 x .06) = $78.63 m

*Note that adjusted after-tax operating income can be obtained by multiplying all of the terms above by (1-T). This differs from the R&D adjustment to after-tax operating income.

Free Cash Flow to the Firm:
EBIT (1-t) = $ 78.63 (1-.4) = $47.18
- Capital Expenditures = 110 (includes two acquisitions)
+ Depreciation = 50
- Change in Non-cash Working Capital = -20
FCFF $7.18 m

Notes:
- The change in non-cash working capital = (180-80)-(200-120) = -20.
- I used the short cut adjustment for operating leases. You could have instead added back the entire operating lease expense and subtracted out depreciation on the leased asset.

4.

a) Net working capital = 91524 – 50596 = 40928
b) Non-cash working capital = 57241 (net out cash and short term debt)
c) Non-cash working capital as a percent of revenues = 36.94%

5.

	1	2	3	4	5
Revenues	$170,446	$187,491	$206,240	$226,864	$249,550
Working capital as % of revenue	36.94%	36.94%	36.94%	36.94%	36.94%
Change in working capital	$5,724	$6,297	$6,926	$7,619	$8,381

	1	2	3	4	5
Revenues	$170,446	$187,491	$206,240	$226,864	$249,550
Working capital as % of revenue	4.30%	4.30%	4.30%	4.30%	4.30%
Change in working capital	$666	$733	$806	$887	$976

Note: I have assumed immediate convergence. If you assume gradual convergence, your ratio will change each year.