PROBLEM SET: Estimating Cash Flows

Exercise 1. *JE* [8]

In the spring of 2010, Jemison Electric was considering an investment in a new distribution center. Jemison's CFO anticipates additional earnings before interest and taxes (EBIT) of $100,000 for the first year of operation of the center in 2011, and, over the next five years, the firm estimates that this amount will grow at a rate of 5% per year. The distribution center will require an initial investment of $400,000 that will be depreciated over a five-year period towards a zero salvage value using straight-line depreciation of $80,000 per year. Furthermore, Jemison expects to invest an amount equal to the firm's annual depreciation expense to maintain the physical plant. These additional capital expenditures will also be depreciated over a period of five years toward a zero salvage value. Jemison's CFO estimates that the distribution center will need additional net working capital equal to 20% of new EBIT (i.e., the change in EBIT from year to year).

Assume the firm faces a 30% tax rate.

1. Calculate the project's annual project free cash flow (FCF) for each of the next five years.

Exercise 2. *FCF estimation* [4]

You are given the following information about a corporation.

The tax on EBITA for 2011 is 20, the amount of necessary cash as a percentage of sales is 2%, and from the income statement and the balance sheet we have

Statement of income

	2010	2011
Sales	250	300
Operating expenses (excluding depreciations)	180	200
Depreciations	45	50
Interest expenses	250	250
Provision for income taxes	10	12
Dividends	30	35
Capital Expenditures	45	50

Consolidated Balance Sheet

	2010	2011
Cash and marketable securities	20	25
Accounts receivables	20	22
Inventory	15	5
Accounts payable	3	6
Taxes Payable	40	60
Debt (book value)	100	100
Common equity (book value)	100	150

1. Compute the Free Cash Flow for year 2011
2. Compute Net Income and reconcile Net Income to NOPLAT.

Exercise 3. *UPR* [5]

Union Pacific Railroad (UPR) reported net income of $770 million in 1993 after interest expenses of $320 million (the corporate tax rate was 36%). It reported depreciation of $960 million in that year, and capital spending was $1.2 billion. The firm also had $4 billion in debt outstanding on the books, rated AA (carrying a yield to maturity of 8%) and trading at par (up from $3.8 billion at the end of 1992). The beta of the stock was 1.05, and there were 200 million shares outstanding (trading at $60 per share), with a book value of $5 billion. Union Pacific's working capital requirements were negligible. The Treasury bond rate was 7%, and the risk premium was 5.5%.

1. Estimate the Free Cash Flow to the Firm in 1993.

Exercise 4. *Cash flows* [5]

How do the cash flows that are discounted when the WACC approach is used to value a business differ from those that are discounted when the free cash flow to equity (FCFE) approach is used to value the equity of a business?

Exercise 5. *FCFE* [2]

Which of the following is the best description of free cash flow to equity?

(a) It is the cash that equity investors can take out of the firm.

(b) It is the dividend that is paid to stockholders.

(c) It is the cash that equity investors can take out of the firm after financing investment needed to sustain future growth.

(d) It is the cash left over after meeting debt payments and paying taxes.

Exercise 6.

A corporation's Annual Report contains the following information:

Sales: 2,000,000 kr.
Variable costs: 850,000 kr.
Overhead costs: 395,000 kr.
Depreciation: 248,000 kr.
Corporate tax rate: 34%

Calculate the corporation's after-tax cash flows

1. 582,620 kr.
2. 724,620 kr.
3. 755,000 kr.
4. 977,620 kr.
5. I choose not to answer.

Exercise 7. *TCM*

The TCM Petroleum Corporation is an integrated oil company headquartered in Forth Worth, Texas. Historical income statements for 2014 and 2015 are found below (dollar figures are in the millions):

TCM Petroleum	Dec-14	Dec-15
Sales	$12,211.00	$13,368.00
Cost of Goods Sold	(9,755.00)	(10,591.00)
Gross Profit	2,456.00	2,777.00
Selling, General, & Administrative Expense	(704.00)	(698.00)
Operating Income Before Deprec.	1,752.00	2,079.00
Depreciation, Depletion, & Amortization	(794.00)	(871.00)
Operating Profit (NOI)	958.00	1,208.00
Interest Expense	(265.00)	(295.00)
Non-Operating Income/Expense	139.00	151.00
Special Items	20.00	-
Pretax Income	852.00	1,064.00
Total Income Taxes	(340.80)	(425.60)
Net Income	$511.20	$638.40

In 2014, TCM made capital expenditures of $875 million, followed by $1,322 million in 2015. TCM also invested and additional $102 million in net working capital in 2014, followed by a decrease in its investment in net working capital of $430 million in 2015.

a. Calculate TCM's FCFs for 2014 and 2015. TCM's tax rate is 40%.

b. Estimate TCM's FCFs for 2016 to 2020 using the following assumptions: Operating income continues to grow at 10% per year over the next five years, CAPEX is expected to be $1,000 million per year, new investments in net working capital are expected to be $100 million per year, and depreciation expense equals the prior year's total plus 10% of the prior year's CAPEX. Note that because TCM is a going concern, we need not be concerned about the liquidation value of the firm's assets at the end of 2020.

Exercise 8. *Steve* [3]

Steve's Sub Shop (Steve's) is considering investing in toaster ovens for each of its 120 stores located in the southwestern United States. The high-capacity conveyor toaster ovens, manufactured by Lincoln, will require an initial investment of $15,000 per store plus $500 in installation costs, for a total investment of $1,860,000. The new capital (including the costs for installation) will be depreciated over five years using straight-line depreciation toward a zero salvage value. In addition, Steve's will also incur additional maintenance expenses totaling $120,000 per year to maintain the ovens. At present, firm revenues for the 120 stores total $9,000,000, and the company estimates that adding the toaster feature will increase revenues by 10%.

- If Steve's faces a 30% tax rate, what expected project FCFs for each of the next five years will result from the investment in toaster ovens?
- If Steve's uses a 9% discount rate to analyze its investments in its stores, what is the project's NPV?

Empirical

Solutions

PROBLEM SET: Estimating Cash Flows

Exercise 1. *JE* [8]

Year	2010	2011	2012	2013	2014	2015
Addd earnings		100.00	105.00	110.25	115.76	121.55
Deprec		-80.00	-80.00	-80.00	-80.00	-80.00
Investment	-400.00					
Maintenance invest	-80.00					
Deprec investment in maintenance		-16.00	-16.00	-16.00	-16.00	-16.00
Taxable income		4.00	9.00	14.25	19.76	25.55
Tax		1.20	2.70	4.27	5.93	7.67
after tax income		2.80	6.30	9.98	13.83	17.89
Change wc	-20.00	-1.00	-1.05	-1.10	-1.16	24.31
FCF	-500.00	97.80	101.25	104.88	108.67	138.20

Exercise 2. *FCF estimation* [4]

1. Computing the Free Cash Flow for year 2011

Sales	300
Costs	−200
Depreciation	−50
EBITA	50
Taxes on EBITA	−20
Changes in taxes payable	20
NOPLAT	50
Depreciation	50
Increase in A/R	−2
Increase in inventories	10
Increase in A/P	3
Increase in necessary cash	−1
Capex	−50
FCF	60

2. Computing Net Income and reconciling Net Income to NOPLAT.

   Note here that clearly all the interest expenses can not be used to reduce taxable income, since the amount set aside for taxes in 2007 is 12.

   We calculated EBITA as 50. The taxes on EBITA is 20, hence the tax rate is $\frac{20}{50} = 40\%$.

   Given that the taxes are estimated as 12, EBT must have been 30.

Sales	300
Operating expenses	−200
Depreciation	−50
Interest expenses	−20
EBT	30
Taxes	−12
Net Income	18
Decrease in taxes payable	20
Interest after taxes	12
NOPLAT	50

Exercise 3. *UPR* [5]

Using the following approach

	Net Income (Profits After Taxes)
+	Change in Taxes payable
+	After-tax financial expenses (e.g. interest)
−	After-tax financial income (e.g. interest)
=	*NOPLAT (Operating profit)*
+	Depreciation and other non-cash expenses
−	Increase in operating working capital
−	Increase in other operating assets (net of operating liabilities)
−	Investments in property, plant, and equipment (capex)
−	Investment in goodwill
=	*Free Cash Flow (FCF)*

$$FCFF = 770 + 320(1 - \tau) + 960 - 1200 = 734.8$$

Exercise 4. *Cash flows* [5]

The cash flows that are discounted when the WACC approach is used to value a business are calculated in the same way that the cash flows are calculated for a project analysis. These cash flows represent the total cash flows that the business is expected to generate from its operations.

The cash flows that are discounted when the FCFE approach is used are the total cash flows from the business that are available for distribution to the shareholders. In other words they equal the total cash flows that the business is expected to generate less the net cash flows to the debt holders. The net cash flows to the debt holders are equal to the interest and principal payments that the firm makes less any proceeds for the sale of new debt.

Exercise 5. *FCFE* [2]

(c)

Exercise 6.

Exercise 7. *TCM*

Given

CAPEX estimated as follows: CAPEX = NET PP&E ending + Depreciation - NET PP&E beginning

Purchase of PP	E (CAPEX)	875	1,322	
Increase in Net Working Capital	102	(430)		Increase in Net Working Capital estimated
TCM's average tax rate	40%	40%		

as follows: NWC 2015 - NWC 2014

Solution

a. FCF Calculations for 2014-2015	Year
2014	2015

Note that we are calculating only the firm's FCF from its operations. Specifically, in 2014 TCM had non-operating income of $151 million and in in 2015 the firm had non-operating income plus special items totaling $159 million. Although these items are not from the firm's normal operations, they do constitute cash flows and if we were trying to value the firm we would want to include their value in the analysis (more about this in Chapter 8).

Net Operating Income (NOI)	$958	$1,208
NOI(1-T) = NOPAT	575	725
Plus: Depreciation Expense	794	871
Less: CAPEX	(875)	(1,322)
Less: Working Capital Investment	(102)	430
Firm Free Cash Flow	$392	$704

b. Estimated FCF for 2016-2015

	Year				
	2016	2017	2018	2019	2020
NOI (Growing at 10% per year)	$1,329	$1,462	$1,608	$1,769	$1,945
NOI (1-.40) = NOPAT	797	877	965	1,061	1,167
Plus: Depreciation Expense	1,003	1,103	1,203	1,303	1,403
Less: CAPEX	(1,000)	(1,000)	(1,000)	(1,000)	(1,000)
Less: Working Capital Investment	(100)	(100)	(100)	(100)	(100)
Firm Free Cash Flow (FCF)	$700	$880	$1,068	$1,264	$1,470

Exercise 8. *Steve* [3]

Invest 1860
Increase revenues by 900/year
Maintenance costs 120
Annual Tax Calculation:
Revenue 900
less Maintenance 120
less depreciation 372
Taxable income 408
tax 122

Annual FCF $900 - 120 - 122 = 658$

t	C_t
0	-1860
1	658
2	658
3	658
4	658
5	658

$$NPV = -1860 + \frac{658}{(1+0.09)^1} + \frac{658}{(1+0.09)^2} + \frac{658}{(1+0.09)^3} + \frac{658}{(1+0.09)^4} + \frac{658}{(1+0.09)^5} = 699.391 \approx 700$$