

Valuation - cash flow estimation

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21 December 2023



1 Introduction

Discounted cash flow analysis conceptually simple: Generate an estimate (forecast) of future cash flows, and discount at an appropriate cost of capital.

While conceptually simple, in practice hard. In this lecture we discuss how generate an estimate of future cash flows.

General problem: Need to go from loose *plans* (corporate strategy/investment decisions) to specific *cash forecasts*.

Two generic situation

- Isolated investment.

Often need to start from scratch.

Either estimate cash flows directly, or estimate future accounting consequences.

- More structured, corporate (full company) valuations.

Start with the current state of the company (the company's accounts), translate the last few year's accounts to cash flow, assume a growth rate applied to e.g. corporate sales, and forecast forward cash flows.

In both settings: Specific skill: Go from accounting statements to cash flows.

2 Generating cash flows for an investment project

Let us look at how we evaluate the cash flows from a project, where we have the full information.

Exercise 1.

In the spring of 2015, Jemison Electric was considering an investment in a new distribution center. Jamison's CFO anticipates additional earnings before interest and taxes (EBIT) of \$100,000 for the first year of operation

of the center, 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 toward a zero salvage value using straight-line depreciation of \$80,000 per year. Jemison's CFO estimates that the distribution center will need operating net working capital equal to 20% of EBIT to support operation.

Assuming the firm faces a 30% tax rate, calculate the project's annual project free cash flows (FCFs) for each of the next five years where the salvage value of operating networking capital and fixed assets is assumed to equal their book values, respectively.

3 Discounted Cash Flow valuation of Companies

Reminder, how to implement the calculation of firm value:

- Value the cash flows of entire firm.
 - adjusting the cost of capital for the tax advantage of debt

WACC

$$\text{Value of firm} = \sum_{t=1}^{\infty} \frac{\text{Cflow firm}(FCF)}{(1 + WACC)^t}$$

- Value the firm in pieces
 - Value cash flows as if 100% equity financed
 - add effect of debt, other nonequity claims

Adjusted present value (APV)

$$\text{Value of firm} = \sum_{t=1}^{\infty} \frac{\text{Cflow firm}(FCF)}{(1 + r^*)^t} + \text{adjustments (tax, etc)}$$

- Value just the equity part, the value of the equity stake in a business.
Flow to equity (FTE)

$$\text{Value of equity} = \sum_{t=1}^{\infty} \frac{\text{Cflow equity}(FCFE)}{(1 + k_e)^t}$$

Need to calculate either

- FCF (Free cash flow to the firm), or
- FCFE (Free cash flow to equity)

4 Free Cash Flow

Definition of *Free Cash Flow (FCF)*:

The amount of cash a company can distribute to all its security holders (debt holders, preferred equity holders, warrant holders, equity holders, etc.)

- To value a company, Find the cash flow the company is able to produce *consistently* over a long horizon.
Cash flow that is generated by regular *operating activities*.

Figure 1 Computing Free Cash Flow (FCF) - basic

	Sales (revenues)
Less	Costs of goods sold
	Gross Profit
Less	Operating expenses (including depreciation)
	Earnings before Interest and Taxes
Less	Taxes
	Net Operating Profit after taxes (NOPAT)
Plus	Depreciation
Less	Capital Expenditure (CAPEX) (Investments)
Less	Increase in Working Capital (ΔNWC)
	Free Cash Flow (FCF)

Figure 2 Computing Free Cash Flow (FCF) - more detailed

Computing FCF (direct method)

	Sales (revenues)
-	Costs
+	Amortizations
=	<i>Earnings before interest, taxes, and amortization (EBITA)</i>
-	Taxes paid on EBITA
+	Increase in deferred taxes and taxes payable
=	<i>NOPLAT (Operating profit)</i>
+	Depreciation
-	Increase in operating working capital
-	Increase in other operating assets (net of operating liabilities)
-	Investments in property, plant, and equipment (capex)
-	Investment in goodwill
=	<i>Free Cash Flow (FCF)</i>

5 Computing Free Cash Flow (FCF)

At the company level, we have a “cookbook” for going from the accounts to the company FCF. The textbook uses the more simplified version in figure 1. There is a more detailed version in figure 2 with bit more broken down categories, which may be useful to make sure you cover these (easily overlooked) issues.

There is an alternative way of generating FCF from accounts that starts from the net income, called the *indirect* method. It is summarized in figure 3

Figure 3 Reconciling FCF to Net Income (indirect method)

	Net Income (Profits After Taxes)
+	Change in Taxes payable
+	After-tax financial expenses (e.g. interest)
–	After-tax financial income (e.g. interest)
=	<i>NOPLAT (Operating profit)</i>
+	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
=	<i>Free Cash Flow (FCF)</i>

To illustrate the use of this cookbook, solve the following example.

Exercise 2.

2000	2001	
<i>Statement of Income</i>		
3,900	4,200	Sales
3,000	2,700	Operating expenses (excl. depreciations)
600	600	Depreciations
365	900	Interest expenses
200	200	Dividends
4,000	100	Capital expenditures
<i>Consolidated Balance Sheet</i>		
500	10,500	Cash and marketable securities
2,000	2,000	Debt (book value)
1,500	11,500	Common equity (book value)
100	140	Accounts receivables
60	60	Inventory
150	200	Accounts payable
45	0	Taxes payable

The tax rate is 35%, the amount of necessary cash as a percentage of sales is 1.0%.

1. Compute the Free Cash Flow for year 2001

6 Free Cash Flow to Equity (FCFE)

There is a corresponding “cookbook” for calculating the Free Cash Flow to Equity (FCFE)

Free Cash Flow to Equity (FCFE)

<i>Sales (revenues)</i>	
–	Costs (excluding depreciation)
–	Change in working capital
–	Interest
–	Provision for income taxes (from income statement)
=	<i>Cash Flow from Operations</i>
–	Investments in property, plant, and equipment (capital expenditures)
+	Proceeds from new debt and preferred equity issues
–	Preferred dividends
–	Debt repayments
=	<i>Free Cash Flow to Equity (FCFE)</i>

Exercise 3.

Diebold Incorporated manufactures, markets, and services automated teller machines in the United States. The following are selected numbers from the financial statements for 1992 and 1993 (in millions):

	1992	1993
Revenues	544.0	620.0
(Less) Operating Expenses	(465.1)	(528.5)
(Less) Depreciation	(12.5)	(14.0)
= Earnings before Interest and Taxes	66.4	77.5
(Less) Interest Expenses	(0.0)	(0.0)
(Less) Taxes	(25.3)	(29.5)
= Net Income	41.1	48.0
Working Capital	175.0	240.0

The firm had capital expenditures of \$15 million in 1992 and \$18 million in 1993. The working capital in 1991 was \$180 million.

1. Estimate the cash flows to equity in 1992 and 1993.
2. What would the cash flows to equity in 1993 have been if working capital had remained at the same percentage of revenue as it was in 1992?

7 Forecasting FCF

- The value of a company is the discounted value of future cash flows. Thus, FCF needs to be forecasted.
- Forecasts are made by forecasting sales or sales growth for a period of 5 to 15 years.
 - Proforma balance sheet and income statements for the first 5 years
 - Only main components of the FCFs for the remaining 5 to 10 years (or say 5–10 and then 10-15 with different growth rates).
- Other items are typically forecasted using the historical relationship to sales. Most important: Cost margins.
- Cash flows beyond the forecasting horizon is captured by the *Terminal Value*

8 Summarizing example

A final exercise

Exercise 4.

Consider an investment opportunity available to Morgan Industries (Morgan), a hypothetical firm. The firm can make an investment in equipment to produce a new product line. The equipment will last for three years. At that time, Morgan can decide whether to continue, change, or end the product line. Thus the decision horizon is three years. The investment will be assumed to occur at the end of the current year, with sales beginning next year. The investment will be fully depreciated over the three years, even though Morgan believes the equipment will have some economic value (salvage value) at the end of the decision horizon. The specific assumed values for this investment are summarized in Table 1.

Table 1. Morgan's new product line investment summary.

Initial investment	180,000
Salvage value	20,000
Fixed annual cash operating expenses	55,000
Revenue in the first year	400,000
Cash variable expenses (% of revenue)	70%
Working capital needs (% of revenue)	10%
Growth rate of sales	15%
Tax rate	25%

1. Calculate the Free Cash Flow for this investment

9 Readings

The material in this lecture is covered in (? , Chapter 2)