Lancaster University Management School

AcF302: Corporate Finance

Capital Budgeting and Valuation with Leverage - Part I

Week 11

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Outline for Weeks 11 and 12

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Week 11:

- Capital budgeting: Refresher.
- Capital budgeting: What is new this year?
- Capital budgeting with leverage: Main methods (WACC, APV, Flow-to-equity).

Week 12:

- Relaxing some of the assumptions:
  - Project has average risk.
  - Constant debt-equity ratio.
  - Corporate taxes are the only imperfection.
- Advanced topics:
  - Periodically adjusted debt.
  - Personal taxes.

Capital Budgeting: Refresher

- Capital budgeting was introduced in AcF214/AcF263.
- Capital budgeting is the process of analyzing investment opportunities and deciding which ones to undertake.
- How could we evaluate a project?
  - We can use techniques (decision rules) like the Net Present Value (NPV), Internal Rate of Return (IRR), and Payback method;
  - The NPV is the most accurate evaluation method.

Capital Budgeting: Refresher

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- In AcF214, the following basic procedure was outlined for calculating the NPV of a project:
  - First, you estimate the incremental free cash flows (FCF) generated by the project;
  - then you discount the FCF based on the project's cost of capital to determine the NPV.

$$NPV = C_0 + \frac{C_1}{1+r} + \frac{C_2}{(1+r)^2} + \frac{C_3}{(1+r)^3} + \cdots$$

- The investment rule using NPV is very simple:
  - Invest if NPV > 0.
  - Reject if NPV < 0.

Capital Budgeting: Refresher

- A perpetuity is a constant cash flow C paid every period, forever.
- PV of a perpetuity is: $\frac{C}{r}$

- An annuity is a constant cash flow C paid every period for N periods.
- PV of an annuity is: $C \times \frac{1}{r}\left(1 - \frac{1}{(1+r)^N}\right)$

- In a growing perpetuity, the cash flows grow at a constant rate *g* each period. The PV of a growing perpetuity is: $\frac{C}{r-g}$

Capital Budgeting: Refresher (Example 1)

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- Bay Properties is considering starting a commercial real estate division. It has prepared the following four-year forecast of free cash flows for this division:

	Year 1	Year 2	Year 3	Year 4
Free Cash Flow	-$185,000	-$12,000	$99,000	$240,000

Assume cash flows after 4 years will grow at 3% per year forever.

a. If the cost of capital for this division is 14%, what is the value in year 4 for cash flows after year 4 (i.e., continuation value)?

b. What is the value today of this division?

a. The expected cash flow in year 5 is

$$240{,}000 \times 1.03 = 247{,}200.$$

- We can value the cash flows in year 5 and beyond as a growing perpetuity:

- Continuation Value$_{(t=4)}$ $= \dfrac{247{,}200}{(0.14 - 0.03)} =$ \$2,247,273

b. We can compute the value of the division today by discounting the free cash flows in years 1 through 4, together with the continuation value.

$$NPV = \frac{-185{,}000}{(1.14)} + \frac{-12{,}000}{(1.14)^2} + \frac{99{,}000}{(1.14)^3} + \frac{240{,}000 + 2{,}247{,}273}{(1.14)^4} = \$1{,}367{,}973$$

Capital Budgeting: Refresher (Example 2)

- Forecasting Free Cash Flows:

	Year	0	1	2	3	4	5
Incremental Earnings Forecast ($000s)							
1	Sales	–	23,500	23,500	23,500	23,500	–
2	Cost of Goods Sold	–	(9,500)	(9,500)	(9,500)	(9,500)	–
3	**Gross Profit**	–	14,000	14,000	14,000	14,000	–
4	Selling, General, and Administrative	–	(3,000)	(3,000)	(3,000)	(3,000)	–
5	Research and Development	(15,000)	–	–	–	–	–
6	Depreciation	–	(1,500)	(1,500)	(1,500)	(1,500)	(1,500)
7	**EBIT**	(15,000)	9,500	9,500	9,500	9,500	(1,500)
8	Income Tax at 40%	6,000	(3,800)	(3,800)	(3,800)	(3,800)	600
9	**Unlevered Net Income**	**(9,000)**	**5,700**	**5,700**	**5,700**	**5,700**	**(900)**
Free Cash Flow ($000s)							
10	Plus: Depreciation	–	1,500	1,500	1,500	1,500	1,500
11	Less: Capital Expenditures	(7,500)	–	–	–	–	–
12	Less: Increases in NWC	–	(2,100)	–	–	–	2,100
13	**Free Cash Flow**	**(16,500)**	**5,100**	**7,200**	**7,200**	**7,200**	**2,700**

- Calculating NPV:

		Year	0	1	2	3	4	5
Net Present Value ($000s)								
1	Free Cash Flow		(16,500)	5,100	7,200	7,200	7,200	2,700
2	Project Cost of Capital	12%						
3	Discount Factor		1.000	0.893	0.797	0.712	0.636	0.567
4	PV of Free Cash Flow		(16,500)	4,554	5,740	5,125	4,576	1.532
5	NPV		5,027					

$$PV(FCF_t) = NPV = \sum_{t=0}^{T} \frac{FCF_t}{(1+r)^t}$$

$$NPV = -16{,}500 + \frac{5{,}100}{1+0.12} + \frac{7{,}200}{(1+0.12)^2} + \frac{7{,}200}{(1+0.12)^3} + \frac{7{,}200}{(1+0.12)^4} + \frac{2{,}700}{(1+0.12)^5} = 5{,}027$$

Cost of Capital: Refresher

- AcF214 capital budgeting: the cost of capital was just given (e.g., last two examples).

- Cost of capital (discount rate): The expected return on investments with comparable risk and horizon.

- In the 2nd part of AcF214, you learned more about how to compute the cost of equity for a company using the CAPM or multi factor models like the Fama-French-Carhart model .

$$E[R_i] = r_i = r_f + \beta_i \times (E[R_{Mkt}] - r_f)$$

$$E[R_s] = r_f + \beta_s^{Mkt}(E[R_{Mkt}] - r_f) + \beta_s^{SMB}E[R_{SMB}] + \beta_s^{HML}E[R_{HML}] + \beta_s^{PR1YR}E[R_{PR1YR}]$$

Cost of Capital: Refresher

- Asset cost of capital or unlevered cost of capital is the expected return required by the firm's investors (i.e., both shareholders and debtholders) to hold the firm's underlying assets, and is computed as the weighted average of the firm's equity and debt costs of capital.

Asset or Unlevered Cost of Capital

$$r_U = \frac{E}{E+D} r_E + \frac{D}{E+D} r_D$$

- The weighted average cost of capital (WACC), measures the cost to the firm after including the benefit of the interest tax shield.

$$r_{wacc} = \frac{E}{E+D} r_E + \frac{D}{E+D} r_D (1 - \tau_c)$$

Capital Budgeting: What is new this year?

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- In AcF214, the focus was on all-equity financed projects. This year, we look at more real-world capital budgeting decisions by considering how firm financing can affect both the cost of capital and the set of cash flows that we discount.
- Three alternative methods to evaluate a project when it is financed by both debt and equity:
  - WACC method.
  - APV method.
  - Flow-to-equity method.
- They always give the same result but in certain situations one method may be easier to use than the others.
- In the remaining part of Week 11's lecture, I will illustrate how to use each of these methods.

1. Weighted Average Cost of Capital Method (WACC)

- The unlevered cost of capital (R_u) can be used to discount the cash flows of an all equity financed project. However, when a project is partly financed with debt, R_u is not suitable because it does not incorporate the benefit of the interest tax shield.

$$r_U = \frac{E}{E+D} r_E + \frac{D}{E+D} r_D = \text{Pretax WACC}$$

- The weighted average cost of capital (WACC), measures the cost to the firm after including the benefit of the interest tax shield.

$$r_{wacc} = \frac{E}{E+D} r_E + \frac{D}{E+D} r_D (1-\tau_c)$$

- Because the WACC incorporates the tax savings from debt, we can compute the levered value of an investment, by discounting its future free cash flow using the WACC.

$$V_0^L = \frac{FCF_1}{1+r_{wacc}} + \frac{FCF_2}{(1+r_{wacc})^2} + \frac{FCF_3}{(1+r_{wacc})^3} + \ldots.$$

- Companies could have different policies when it comes to deciding the level or the percentage of debt in their capital structure.

- For the remaining part of this lecture (Week 11), we will assume that a firm wants to maintain a constant debt-equity ratio, and we will see how having such a debt policy could affect the valuation and financing of the firm's projects.

- For the remaining part of this lecture (Week 11), I will focus on two examples of investments that a company named Avco is considering to illustrate how the three valuation methods (WACC, APV and FTE) can be used .
  - First investment: Introduction of a new line of packaging (the RFX series).
  - Second investment: Acquisition of another company.

Using the WACC to value a project: Example 1 (RFX project)

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- Assume Avco is considering introducing a new line of packaging, the RFX Series.
  - Technology: obsolete after 4 years (& will be depreciated using the straight-line method).
  - Annual sales: $60 million per year over the next 4 years.
  - Manufacturing costs: $25 million per year.
  - Operating expenses: $9 million per year.
  - Upfront R&D and marketing expenses: $6.67 million
  - Investment in equipment: $24 million
  - No net working capital required.
  - Corporate tax rate: 40%.

What is the NPV of this project?

Expected Free Cash Flow from Avco's RFX Project

	Year	0	1	2	3	4
Incremental Earnings Forecast ($ million)						
1	Sales	—	60.00	60.00	60.00	60.00
2	Cost of Goods Sold	—	(25.00)	(25.00)	(25.00)	(25.00)
3	**Gross Profit**	—	35.00	35.00	35.00	35.00
4	Operating Expenses	(6.67)	(9.00)	(9.00)	(9.00)	(9.00)
5	Depreciation	—	(6.00)	(6.00)	(6.00)	(6.00)
6	**EBIT**	(6.67)	20.00	20.00	20.00	20.00
7	Income Tax at 40%	2.67	(8.00)	(8.00)	(8.00)	(8.00)
8	**Unlevered Net Income**	(4.00)	12.00	12.00	12.00	12.00
Free Cash Flow						
9	Plus: Depreciation	—	6.00	6.00	6.00	6.00
10	Less: Capital Expenditures	(24.00)	—	—	—	—
11	Less: Increases in NWC	—	—	—	—	—
12	**Free Cash Flow**	**(28.00)**	**18.00**	**18.00**	**18.00**	**18.00**

Avco's Current Market Value Balance Sheet ($ million) & Cost of Capital without the RFX Project

Assets		Liabilities		Cost of Capital	
Cash	20	Debt	320	Debt	6%
Existing Assets	600	Equity	300	Equity	10%
Total Assets	620	Total Liabilities and Equity	620		

- Avco intends to maintain a similar (net) debt-equity ratio for the foreseeable future, including any financing related to the RFX project. Thus, Avco's WACC is

$$r_{wacc} = \frac{E}{E+D} r_E + \frac{D}{E+D} r_D (1-\tau_c) = \frac{300}{600}(10\%) + \frac{300}{600}(6\%)(1-0.40)$$
$$= 6.8\%$$

Note: that net debt (D) = 320 − 20 = $300 million.

- The value of the project, including the tax shield from debt, is calculated as the present value of its future free cash flows.

$$V_0^L = \frac{18}{1.068} + \frac{18}{1.068^2} + \frac{18}{1.068^3} + \frac{18}{1.068^4} = \$61.25 \text{ million}$$

- The NPV of the project is $33.25 million

  $61.25 million − $28 million = $33.25 million

Why did we use Net Debt in our calculation?

- Sometimes firms maintain large cash balances in excess of their operating needs. This cash represents a risk-free asset on the firm's balance sheet, and reduces the average risk of the firm's assets.

- We are often interested in the risk of the firm's underlying business operations, separate from its cash holdings (i.e., the risk of the firm's enterprise value, which is the combined market value of the firm's equity and debt, less any excess cash).

Summary of WACC method:

1. Determine the FCF of the investment.
2. Compute the WACC.
3. Compute the value of the investment (V_L) by discounting the FCF of the investment using the WACC.

- Note: The WACC can be used throughout the firm as the companywide cost of capital for new investments **that are of comparable risk to the rest of the firm and that will not alter the firm's debt-equity ratio**.

Implementing a constant Debt-Equity ratio: How much debt does Avco need to raise for the RFX project?

- By undertaking the RFX project, Avco adds new assets to the firm with initial market value \$61.25 million (V_L).
  - Therefore, to maintain its debt-to-value ratio, Avco must add \$30.625 million in new debt.
    - 50% × 61.25 = \$30.625
- Avco can add this debt either by reducing cash or by borrowing and increasing debt.
  - Assume Avco decides to spend its \$20 million in cash and borrow an additional \$10.625 million.
    - Because only \$28 million is required to fund the project, Avco will pay the remaining \$2.625 million to shareholders through a dividend.

      \$30.625 million − \$28 million = \$2.625 million

Avco's Current Market Value
Balance Sheet ($ Million) with the RFX Project

Assets		Liabilities	
Cash	—	Debt	330.625
Existing Assets	600.00		
RFX Project	61.25	Equity	330.625
Total Assets	661.25	Total Liabilities and Equity	661.25

- The market value of Avco's equity increases by $30.625 million.

  $300 + $30.625 = $330.625

- Adding the dividend of $2.625 million, the shareholders' total gain is $33.25 million.

  $30.625 + 2.625 = $33.25

  – which is exactly the NPV calculated for the RFX project

Implementing a constant Debt-Equity ratio

- **Debt Capacity**
  - The amount of debt at a particular date that is required to maintain the firm's target debt-to-value ratio.
  - The debt capacity at date *t* is calculated as

$$D_t = d \times V_t^L$$

    - Where *d* is the firm's target debt-to-value ratio and V^L_t is the levered value on date t.

Value and Debt Capacity of the RFX Project Over Time

	Year	0	1	2	3	4
Project Debt Capacity ($ million)						
1	**Free Cash Flow**	(28.00)	18.00	18.00	18.00	18.00
2	Levered Value, V^L (at $r_{wacc} = 6.8\%$)	61.25	47.41	32.63	16.85	—
3	**Debt Capacity, D_t (at $d = 50\%$)**	**30.62**	**23.71**	**16.32**	**8.43**	**—**

Value of *FCF* in year $t + 2$ and beyond

$$V_t^L = \frac{FCF_{t+1} + V_{t+1}^L}{1 + r_{wacc}}$$

WACC method: Example 2 (Acquisition)

Valuing an Acquisition Using the WACC Method

Suppose Avco is considering the acquisition of another firm in its industry that specializes in custom packaging.

The acquisition is expected to increase Avco's free cash flow by $3.8 million the first year, and this contribution is expected to grow at a rate of 3% per year from then on.

Avco has negotiated a purchase price of $80 million.

After the transaction, Avco will adjust its capital structure to maintain its current debt-equity ratio of 50%. If the acquisition has similar risk to the rest of Avco, what is the value of this deal?

Solution

The free cash flows of the acquisition can be valued as a growing perpetuity. Because its risk matches the risk for the rest of Avco, and because Avco will maintain the same debt-equity ratio going forward, we can discount these cash flows using the WACC of 6.8% (calculated earlier). Thus, the value of the acquisition is

$$V^L = \frac{3.8}{6.8\% - 3\%} = \$100 \text{ million}$$

Given the purchase price of $80 million, the acquisition has an NPV of $20 million.

Debt Capacity for the Acquisition

How much debt must Avco use to finance the acquisition and still maintain its debt-to-value ratio of 50%? How much of the acquisition cost must be financed with equity?

Solution

From the previous slide, we know that the market value of the assets acquired in the acquisition, V_L is $100 million.

Thus, to maintain a 50% debt-to-value ratio, Avco must increase its debt by $50 million (50% x $100 million).

The remaining $30 million of the $80 million acquisition cost will be financed with new equity.

In addition to the $30 million in new equity, the value of Avco's existing shares will increase by the $20 million NPV of the acquisition, so in total the market value of Avco's equity will rise by $50 million.

2. Adjusted Present Value Method

- Adjusted Present Value (APV)
  - A valuation method to determine the levered value of an investment by first calculating its unlevered value and then adding the value of the interest tax shield.

$$V^L = APV = V^U + PV(\text{Interest Tax Shield})$$

- The first step in the APV method is to calculate V_U: the present value of the FCFs using the project's cost of capital if it were financed without leverage (r_u).

The Unlevered Value of the Project (Vu)

- Unlevered Cost of Capital
  - For a firm that maintains a target leverage ratio, it can be estimated as the weighted average cost of capital computed without taking into account taxes (pre-tax WACC).

$$r_U = \frac{E}{E+D} r_E + \frac{D}{E+D} r_D = \text{Pretax WACC}$$

- For Avco, its unlevered cost of capital is calculated as

$$r_U = 0.50 \times 10.0\% + 0.50 \times 6.0\% = 8.0\%$$

- The project's value without leverage is calculated as

$$V^U = \frac{18}{1.08} + \frac{18}{1.08^2} + \frac{18}{1.08^3} + \frac{18}{1.08^4} = \$59.62 \text{ million}$$

Valuing the Interest Tax Shield

Interest paid in year $t = r_D \times D_{t-1}$

- The interest tax shield is equal to the interest paid multiplied by the corporate tax rate (information on debt capacity is from slide 25).

	Year	0	1	2	3	4
Interest Tax Shield ($ million)						
1	**Debt Capacity, D_t (at $d = 50\%$)**	30.62	23.71	16.32	8.43	—
2	Interest Paid (at $r_D = 6\%$)		1.84	1.42	0.98	0.51
3	**Interest Tax Shield (at $\tau_c = 40\%$)**		**0.73**	**0.57**	**0.39**	**0.20**

Valuing the Interest Tax Shield

- The next step is to find the present value of the interest tax shield.
  - Note: When the firm maintains a target leverage ratio, its future interest tax shields have similar risk to the project's cash flows, so they should be discounted at the project's unlevered cost of capital.

$$PV(\text{interest tax shield}) = \frac{0.73}{1.08} + \frac{0.57}{1.08^2} + \frac{0.39}{1.08^3} + \frac{0.20}{1.08^4} = \$1.63 \text{ million}$$

$$V^L = V^U + PV(\text{interest tax shield}) = 59.62 + 1.63 = \$61.25 \text{ million}$$

NPV = \$61.25 million − \$28 million = \$33.25 million

This is exactly the same value found using the WACC method

Summary of the APV Method

1. Determine the investment's value without leverage (Vu)
2. Determine the present value of the interest tax shield.
   a. Determine the expected interest tax shield.
   b. Discount the interest tax shield.
3. Add the unlevered value to the present value of the interest tax shield to determine the value of the investment with leverage

- The APV method has some advantages:
  - It can be easier to apply than the WACC method when the firm does not maintain a constant debt-equity ratio (Week 12).
  - The APV approach also explicitly values market imperfections (e.g., taxation) and therefore allows managers to measure their contribution to value (Week 12).

Back to the acquisition example

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Using the APV Method to value an Acquisition

Consider again Avco's acquisition example.

The acquisition will contribute $3.8 million in FCFs the first year, which will grow by 3% per year thereafter.

The acquisition cost of $80 million will be financed with $50 million in new debt initially.

Compute the value of the acquisition using the APV method.

Solution

First, we compute the value without leverage. Given Avco's unlevered cost of capital of r_U = 8% (slide 30), We get

$$V^U = \frac{3.8}{(8\% - 3\%)} = \$76 \text{ million}$$

- Avco will add new debt of $50 million initially to fund the acquisition (slide 28).
- At a 6% interest rate, the interest expense the first year is

  6% × 50 = $3 million.

  which provides an interest tax shield of 40% × $3m = $1.2 million.
- Because the value of the acquisition is expected to grow by 3% per year, the amount of debt the acquisition supports – and, therefore, the interest tax shield – is expected to grow at the same rate.
- *PV* (interest tax shield) = 1.2 / (8% − 3%) = $24 million

The value of the acquisition with leverage is given by the APV:

$$V^L = V^U + PV\,(\text{interest tax shiled}) = 76 + 24 = \$100\,\text{million}$$

NPV of 100 − 80 = $20 million for the acquisition. Without the benefit of the interest tax shield, the NPV would be 76 − 80 = − $4 million

3. Flow-to-Equity Method

- A valuation method that calculates the free cash flow available to equity holders **taking into account all payments to and from debt holders.**

- The cash flows to equity holders are then discounted using the equity cost of capital.

- The first step in the FTE method is to determine the project's free cash flow to equity (FCFE).
  - FCFE is the free cash flow that remains after adjusting for interest payments, debt issuance, and debt repayments.

Expected FCFE from Avco's RFX Project

	Year	0	1	2	3	4
Incremental Earnings Forecast ($ million)						
1	Sales	—	60.00	60.00	60.00	60.00
2	Cost of Goods Sold	—	(25.00)	(25.00)	(25.00)	(25.00)
3	**Gross Profit**	—	35.00	35.00	35.00	35.00
4	Operating Expenses	(6.67)	(9.00)	(9.00)	(9.00)	(9.00)
5	Depreciation	—	(6.00)	(6.00)	(6.00)	(6.00)
6	**EBIT**	(6.67)	20.00	20.00	20.00	20.00
7	Interest Expense	—	(1.84)	(1.42)	(0.98)	(0.51)
8	**Pretax Income**	(6.67)	18.16	18.58	19.02	19.49
9	Income Tax at 40%	2.67	(7.27)	(7.43)	(7.61)	(7.80)
10	**Net Income**	(4.00)	10.90	11.15	11.41	11.70
Free Cash Flow to Equity						
11	Plus: Depreciation	—	6.00	6.00	6.00	6.00
12	Less: Capital Expenditures	(24.00)	—	—	—	—
13	Less: Increases in NWC	—	—	—	—	—
14	Plus: Net Borrowing	30.62	(6.92)	(7.39)	(7.89)	(8.43)
15	**Free Cash Flow to Equity**	**2.62**	**9.98**	**9.76**	**9.52**	**9.27**

To calculate Interest Expense & Net Borrowing, remember:

Debt Capacity, D_t (at d = 50%)	**30.62**	**23.71**	**16.32**	**8.43**	**—**

- The FCFE can also be calculated directly if you know the FCF, as

$$FCFE = FCF - \underbrace{(1-\tau_c)\times(\text{Interest Payments})}_{\text{After-tax interest expense}} + (\text{Net Borrowing})$$

	Year	0	1	2	3	4
Free Cash Flow to Equity ($ million)						
1	**Free Cash Flow**	(28.00)	18.00	18.00	18.00	18.00
2	After-tax Interest Expense	—	(1.10)	(0.85)	(0.59)	(0.30)
3	Net Borrowing	30.62	(6.92)	(7.39)	(7.89)	(8.43)
4	**Free Cash Flow to Equity**	**2.62**	**9.98**	**9.76**	**9.52**	**9.27**

Valuing Equity Cash Flows

- Because the FCFE represent payments to equity holders, they should be discounted at the project's equity cost of capital.
  - Given that the risk and leverage of the RFX project are the same as for Avco overall, we can use Avco's equity cost of capital of 10.0% to discount the project's FCFE.

$$NPV(FCFE) = 2.62 + \frac{9.98}{1.10} + \frac{9.76}{1.10^2} + \frac{9.52}{1.10^3} + \frac{9.27}{1.10^4} = \$33.25 \text{ million}$$

- The value of the project's FCFE represents the gain to shareholders from the project, and it is identical to the NPV computed using the WACC and APV methods.

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Summary of the Flow-to-Equity Method

1. Determine the FCFE of the investment.

2. Determine the equity cost of capital.

3. Compute the equity value by discounting the FCFE using the equity cost of capital.

Advantages & Disadvantages of the Flow-to-Equity Method

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- Advantages:
  - It may be simpler to use if the firm's capital structure is complex and the market values of other securities in the firm's capital structure are not known.
  - It may be viewed as a more transparent method for discussing a project's benefit to shareholders by emphasizing a project's implication for equity.
- Disadvantage:
  - One must compute the project's debt capacity to determine the interest and net borrowing before capital budgeting decisions can be made. Remember: the APV method has the same disadvantage.

Back to the acquisition example

Using the FTE Method to Value an Acquisition

Problem

Consider again Avco's acquisition example.

The acquisition will contribute $3.8 million in FCFs the first year, growing by 3% per year thereafter.

The acquisition cost of $80 million will be financed with $50 million in new debt initially.

What is the value of this acquisition using the FTE method?

Solution

Because the acquisition is being financed with $50 million in new debt, the remaining $30 million of the acquisition cost must come from equity:

$$FCFE_0 = -80 + 50 = -\$30 \text{ million}$$

In one year, the interest on the debt will be 6% × 50 = $3 million. Because Avco maintains a constant debt-equity ratio, the debt associated with the acquisition is also expected to grow at a 3% rate: 50 × 1.03 = $51.5 million. Therefore, Avco will borrow an additional 51.5 − 50 = $1.5 million in one year.

$$FCFE = FCF - (1 - \tau_c) \times (\text{Interest Payments}) + (\text{Net Borrowing})$$

$$FCFE_1 = +3.8 - (1 - 0.40) \times 3 + 1.5 = \$3.5 \text{ million}$$

After year 1, FCFE will also grow at a 3% rate. Using the cost of equity r_E = 10%, we compute the NPV:

$$NPV(FCFE) = -30 + \frac{3.5}{(10\% - 3\%)} = \$20 \text{ million}$$