# Equity Securities

TOPIC 8: FREE CASH FLOW VALUATION

(LECTURE EXAMPLES & SOLUTIONS ONLY)

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Outcome 8.3

## Computing FCFF from net income

- **Using the information below and on the next two slides, calculate Cane Distribution Inc's FCFF, starting with net income**

| Cane Distribution Inc Income Statement | 2001 US\$m | 2002 US\$m | 2003 US\$m |
|---|---|---|---|
| EBITDA | 200.00 | 220.00 | 242.00 |
| Depreciation | 45.00 | 49.50 | 54.45 |
| **EBIT** | **155.00** | **170.50** | **187.55** |
| Interest expense | 15.68 | 17.25 | 18.97 |
| **Income before tax** | **139.32** | **153.25** | **168.58** |
| Taxes @30% | 41.80 | 45.97 | 50.58 |
| **Net income** | 97.52 | 107.28 | 118.00 |



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Outcome 8.3

## Computing FCFF from net income

| Cane Distribution Inc Balance Sheet | 2000 US\$m | 2001 US\$m | 2002 US\$m | 2003 US\$m |
|---|---|---|---|---|
| Cash | 0.00 | 108.92 | 228.74 | 360.54 |
| Accounts receivable | 0.00 | 100.00 | 110.00 | 121.00 |
| Inventory | 60.00 | 66.00 | 72.60 | 79.86 |
| Net fixed assets | 500.00 | 455.00 | 455.50 | 456.05 |
| **Total assets** | **560.00** | **729.92** | **866.84** | **1,017.45** |
| Accounts payable | 0.00 | 50.00 | 55.00 | 60.50 |
| Long-term debt | 224.00 | 246.40 | 271.04 | 298.15 |
| **Total liabilities** | **224.00** | **296.40** | **326.04** | **358.65** |
| Common stock | 336.00 | 336.00 | 336.00 | 336.00 |
| Retained earnings | 0.00 | 97.52 | 204.80 | 322.80 |
| **Total shareholders' equity** | **336.00** | **433.52** | **540.80** | **658.80** |
| **Total liabilities & shareholders' equity** | **560.00** | **729.92** | **866.84** | **1,017.45** |



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Outcome 8.3

## Computing FCFF from net income

| Cane Distribution Inc Cash Flow Statement | 2001 US\$m | 2002 US\$m | 2003 US\$m |
|---|---|---|---|
| Net income | 97.52 | 107.28 | 118.00 |
| Depreciation | 45.00 | 49.50 | 54.45 |
| Change in working capital | -56.00 | -11.60 | -12.76 |
| **Cash from operating activities** | **86.52** | **145.18** | **159.69** |
| Purchases of fixed assets | 0.00 | -50.00 | -55.00 |
| **Cash from investing activities** | **0.00** | **-50.00** | **-55.00** |
| Net borrowing | 22.40 | 24.64 | 27.10 |
| **Cash from financing activities** | **22.40** | **24.64** | **27.10** |
| Cash and equivalents increase | 108.92 | 119.82 | 131.79 |
| Cash and equivalents (beginning of year) | 0.00 | 108.92 | 228.74 |
| **Cash and equivalents (end of year)** | **108.92** | **228.74** | **228.74** |



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Outcome 8.3

## Computing FCFF from net income

- **Using the information provided, calculate Cane Distribution Inc's FCFF, starting with net income**
- The first step is to calculate the increase in working capital

| | 2000 | 2001 | 2002 | 2003 |
|---|---|---|---|---|
| Accounts receivable | \$0.00 | \$100.00 | \$110.00 | \$121.00 |
| plus Inventory | 60.00 | 66.00 | 72.60 | 79.86 |
| less Accounts payable | 0.00 | 50.00 | 55.00 | 60.50 |
| Working capital | \$60.00 | \$116.00 | \$127.60 | \$140.36 |
| Increase in working capital | | \$56.00 | \$11.60 | \$12.76 |



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Outcome 8.3

## Computing FCFF from net income

- **Using the information provided, calculate Cane Distribution Inc's FCFF, starting with net income**
- We can then calculate FCFF using the previous formula

| | 2001 | 2002 | 2003 |
|---|---|---|---|
| Net income | \$97.52 | \$107.28 | \$118.00 |
| plus Depreciation | 45.00 | 49.50 | 54.45 |
| plus Interest expense x (1 – tax rate) | 10.98 | 12.08 | 13.28 |
| less Investment in fixed capital | 0.00 | -50.00 | -55.00 |
| less Investment in working capital | -56.00 | -11.60 | -12.76 |
| Free cash flow to the firm | \$97.50 | \$107.26 | \$117.97 |

Outcome 8.3

## Computing FCFF from cash flow

- **Using the financial statements previously provided, calculate Cane Distribution Inc's FCFF, starting with cash flow from operations**

| | 2001 | 2002 | 2003 |
|---|---|---|---|
| Cash flow from operations | $86.52 | $145.18 | $159.69 |
| plus Interest expense x (1 – tax rate) | 10.98 | 12.08 | 13.28 |
| less Investment in fixed capital | 0.00 | -50.00 | -55.00 |
| Free cash flow to the firm | $97.50 | $107.26 | $117.97 |



Outcome 8.3

## Computing FCFE from FCFF

- **Using the financial statements previously provided, calculate Cane Distribution Inc's FCFE, starting with FCFF**

| | 2001 | 2002 | 2003 |
|---|---|---|---|
| Free cash flow to the firm | $97.50 | $107.26 | $117.97 |
| less Interest expense x (1 – tax rate) | -10.98 | -12.08 | -13.28 |
| plus Net borrowing | 22.40 | 24.64 | 27.10 |
| Free cash flow to equity | $108.92 | $119.82 | $131.79 |



Outcome 8.4

## Computing FCFF and FCFE

- **Using the information below and on the next 2 slides, calculate Pitt Corp's FCFE, starting with FCFF, net income, CFO, EBIT and EBITDA**

| Pitt Corporation Income Statement | 2003 US$m |
|---|---|
| Total revenue | 3,000 |
| Operating costs and expenses | 2,200 |
| **EBITDA** | **800** |
| Depreciation | 300 |
| **EBIT** | **500** |
| Interest expense | 100 |
| **Income before tax** | **400** |
| Taxes @ 40% | 160 |
| **Net income** | **240** |



Outcome 8.4

## Computing FCFF and FCFE

| Pitt Corporation Balance Sheet | 2002 US$m | 2003 US$m |
|---|---|---|
| Cash and equivalents | 190 | 200 |
| Accounts receivable | 560 | 600 |
| Inventory | 410 | 440 |
| Gross fixed assets | 2,200 | 2,600 |
| Accumulated depreciation | -900 | -1,200 |
| **Total assets** | **2,460** | **2,640** |
| Accounts payable | 285 | 300 |
| Accrued taxes and expenses | 140 | 150 |
| Notes payable | 200 | 250 |
| Long-term debt | 865 | 890 |
| **Total liabilities** | **1,490** | **1,590** |
| **Total shareholders' equity** | **970** | **1,050** |
| **Total liabilities & shareholders' equity** | 2,460 | 2,640 |



Outcome 8.4

## Computing FCFF from net income

| Pitt Corporation Cash Flow Statement | 2003 US$m |
|---|---|
| Net income | 240 |
| Depreciation | 300 |
| Change in working capital | -45 |
| **Cash from operating activities** | **495** |
| Purchases of fixed assets | -400 |
| **Cash from investing activities** | **-400** |
| Notes payable | 50 |
| Long-term debt | 25 |
| Common stock dividends | -160 |
| **Cash from financing activities** | **-85** |
| Cash and equivalents increase | 10 |
| Cash and equivalents (beginning of year) | 190 |
| **Cash and equivalents (end of year)** | **200** |



Outcome 8.4

## Computing FCFF and FCFE

- **Using the information provided, calculate Pitt Corporation's FCFE, starting with FCFF, net income, CFO, EBIT and EBITDA**
- Calculate FCFF from net income

| | | 2003 |
|---|---|---|
| Net income | | 240 |
| plus Non-cash charges | | 300 |
| plus Interest expense x (1 – Tax Rate) | 100 x (1 – 0.40) | 60 |
| less Investment in fixed capital | | -400 |
| less Investment in working capital | 40 + 30 – 15 – 10 | -45 |
| Free cash flow to the firm | | 155 |

Outcome 8.4

## Computing FCFF and FCFE

- **Using the information provided, calculate Pitt Corporation's FCFE, starting with FCFF, net income, CFO, EBIT and EBITDA**
- Calculate FCFE from FCFF

| | | 2003 |
|---|---|---|
| Free cash flow to the firm | | 155 |
| less Interest expense x (1 – Tax Rate) | 100 x (1 – 0.40) | -60 |
| plus Net borrowing | 50 + 25 | 75 |
| Free cash flow to equity | | 170 |



Outcome 8.4

## Computing FCFF and FCFE

- **Using the information provided, calculate Pitt Corporation's FCFE, starting with FCFF, net income, CFO, EBIT and EBITDA**
- Calculate FCFE from net income

| | | 2003 |
|---|---|---|
| Net income | | 240 |
| plus Non-cash charges | | 300 |
| less Investment in fixed capital | | -400 |
| less Investment in working capital | 40 + 30 – 15 – 10 | -45 |
| plus Net borrowing | 50 + 25 | 75 |
| Free cash flow to equity | | 170 |



Outcome 8.4

## Computing FCFF and FCFE

- **Using the information provided, calculate Pitt Corporation's FCFE, starting with FCFF, net income, CFO, EBIT and EBITDA**
- Calculate FCFF from CFO

| | | 2003 |
|---|---|---|
| Cash flow from operations | | 495 |
| plus Interest expense x (1 – Tax Rate) | 100 x (1 – 0.40) | 60 |
| less Investment in fixed capital | | -400 |
| Free cash flow to the firm | | 155 |



Outcome 8.4

## Computing FCFF and FCFE

- **Using the information provided, calculate Pitt Corporation's FCFE, starting with FCFF, net income, CFO, EBIT and EBITDA**
- Calculate FCFE from CFO

| | | 2003 |
|---|---|---|
| Cash flow from operations | | 495 |
| less Investment in fixed capital | | -400 |
| plus Net borrowing | 50 + 25 | 75 |
| Free cash flow to equity | | 170 |



Outcome 8.4

## Computing FCFF and FCFE

- **Using the information provided, calculate Pitt Corporation's FCFE, starting with FCFF, net income, CFO, EBIT and EBITDA**
- Calculate FCFE from EBIT

| | | 2003 |
|---|---|---|
| EBIT x (1 – Tax Rate) | 500 x (1 – 0.40) | 300 |
| plus Non-cash charges | | 300 |
| less Interest expense x (1 – Tax Rate) | 100 x (1 – 0.40) | -60 |
| less Investment in fixed capital | | -400 |
| less Investment in working capital | 40 + 30 – 15 – 10 | -45 |
| plus Net borrowing | 50 + 25 | 75 |
| Free cash flow to equity | | 170 |



Outcome 8.4

## Computing FCFF and FCFE

- **Using the information provided, calculate Pitt Corporation's FCFE, starting with FCFF, net income, CFO, EBIT and EBITDA**
- Calculate FCFE from EBITDA

| | | 2003 |
|---|---|---|
| EBITDA x (1 – Tax Rate) | 800 x (1 – 0.40) | 480 |
| plus Depreciation x Tax Rate | 300 x 0.40 | 120 |
| less Interest expense x (1 – Tax Rate) | 100 x (1 – 0.40) | -60 |
| less Investment in fixed capital | | -400 |
| less Investment in working capital | 40 + 30 – 15 – 10 | -45 |
| plus Net borrowing | 50 + 25 | 75 |
| Free cash flow to equity | | 170 |

Outcome 8.5

## Forecasting FCFF

- An analyst valuing Pitts Corporation at the end of 2003 estimates sales (currently $3,300m) to grow by 10% p.a. from 2004 onwards
- In 2004 the EBIT margin will be maintained at the 2003 level of 16.67%, but decline to 14.5% over the next 4 years
- The incremental fixed capital and working capital ratios are expected to be maintained at 2003 levels

- Calculate Pitts Corp's FCFF over the next five years



Outcome 8.5

## Forecasting FCFF

- Calculate Pitt Corp's FCFF over the next five years

| | | 2003 | 2004(e) |
|---|---|---|---|
| Prior year sales | | 3,000 | 3,300 |
| Sales growth | forecast | 10% | |
| EBIT margin | 500 / 3000 | 16.7% | |
| Tax rate | 160 / 400 | 40% | |
| EBIT x (1 – Tax Rate) | (3,300 x 0.1667) x (1 – 0.40) | | 330 |
| Incremental FCI | (400 – 300) / (3,000 x 0.10) | 33.3% | -100 |
| Incremental WCI | 45 / (3000 x 0.10) | 15% | -45 |
| Free cash flows to the firm | | | 185 |



Outcome 8.5

## Forecasting FCFF

- Calculate Pitt Corp's FCFF over the next five years

| | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 |
|---|---|---|---|---|---|---|
| Prior year sales | 3,000 | 3,300 | 3,630 | 3,992 | 4,392 | 4,831 |
| Sales growth | 10% | 10% | 10% | 10% | 10% | 10% |
| EBIT margin | 16.7% | 16.0% | 15.5% | 15.0% | 14.5% | 14.0% |
| Tax rate | 40% | 40% | 40% | 40% | 40% | 40% |
| EBIT x (1 – Tax Rate) | | 330 | 348 | 371 | 395 | 420 |
| Incremental FCI | 33.3% | -100 | -110 | -121 | -133 | -146 |
| Incremental WCI | 15% | -45 | -50 | -54 | -60 | -66 |
| Free cash flow to the firm | | 185 | 188 | 196 | 202 | 208 |



Outcome 8.5

## Forecasting FCFE

- An analyst valuing Pitts Corporation at the end of 2003 estimates sales (currently $3,300m) to grow by 10% p.a. from 2004 onwards
- In 2004 the net income margin will be maintained at the 2003 level of 8%
- The incremental fixed capital and working capital ratios are expected to be maintained at 2003 levels

- Calculate Pitts Corporation's FCFE for 2004



Outcome 8.5

## Forecasting FCFF

- Calculate Pitt Corp's FCFE for 2004

| | | 2003 | 2004(e) |
|---|---|---|---|
| Prior year sales | | 3,000 | 3,300 |
| Sales growth | forecast | 10% | |
| NI margin | 240 / 3000 | 8% | |
| Net income | | | 264 |
| Incremental FCI | (400 – 300) / (3,000 x 0.10) | 33.3% | -100 |
| Incremental WCI | 45 / (3000 x 0.10) | 15% | -45 |
| Gearing of new funds | Target | 50% | |
| Net borrowing | (100 + 45) x 0.50 | | 72 |
| Free cash flows to equity | | | 191 |



Outcome 8.10

## One-stage model

- Cagiati Enterprises (CE) has FCFF of CHF700m, FCFE of CHF620m and expects to grow FCFF forever at 5% p.a.
- CE's before-tax cost of debt is 5.7% and its required return on equity is 11.8%
- CE expects a target capital structure of 20% debt and 80% equity
- CE has debt outstanding with a market value of CHF2.2b and 200m outstanding common shares
- The tax rate is 33.33%

- Calculate CE's intrinsic value per share

Outcome 8.10

## One-stage model

- **Calculate CE's intrinsic value per share**
- $$WACC = \left(\frac{\text{MV Debt}}{\text{MV Debt} + \text{MV Equity}}\right) \times r_d\,(1 - \text{Tax Rate}) + \left(\frac{\text{MV Equity}}{\text{MV Debt} + \text{MV Equity}}\right) \times r$$
$$= [0.20 \times 0.057 \times (1 - 0.3333)] + [0.80 \times 0.118] = 10.2\%$$
- $$\text{Equity Value} = \frac{FCFF_0\,(1+g)}{WACC - g} - \text{MV Debt}$$
$$= \frac{700 \times (1 + 0.05)}{0.102 - 0.05} - 2{,}200 = CHF11{,}934.6m$$
- $$\text{Value per share} = \frac{11{,}934.6m}{200m} = CHF59.67$$



Outcome 8.10

## Two-stage model

- **On 1/1/03, Vishal Noronha is valuing Sindhuh Enterprises (SE), which had an EPS of $2.40 in 2002**
- **For the next five years EPS is estimated to grow by 30%, 18%, 12% and 9%, respectively, and 7% thereafter**
- **Net investment in fixed capital per share is estimated for each of the next five years at 3.0, 2.5, 2.0, 1.5 and 1.0, respectively, and to grow by 7% thereafter**
- **Investment in working capital equals 50% of investment in fixed capital**
- **Investment in capital is funded 30% by new debt**
- **$R_F$ is 6%, the equity risk premium is 4% and beta is 1.1**

- **Calculate SE's intrinsic value per share on 1/1/03**
- **What should be the trailing P/E on 1/1/03 and 1/1/07?**



Outcome 8.10

## Two-stage model

- **Calculate SE's intrinsic value per share on 1/1/03**
- $$\text{Required rate of return} = R_F + \beta_i\left[E(R_M) - R_F\right]$$
$$= 0.06 + (1.1 \times 0.04) = 10.4\%$$

| | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 |
|---|---|---|---|---|---|---|
| EPS growth rate | | 30% | 18% | 12% | 9% | 7% |
| EPS | 2.400 | 3.120 | 3.682 | 4.123 | 4.494 | 4.809 |
| less Net FC Exp | | -3.000 | -2.500 | -2.000 | -1.500 | -1.000 |
| less Net WC Exp | | -1.500 | -1.250 | -1.000 | -0.750 | -0.500 |
| plus Net Borrowing | | 1.350 | 1.125 | 0.900 | 0.675 | 0.450 |
| FCFE per share | | -0.030 | 1.057 | 2.023 | 2.919 | 3.759 |



Outcome 8.10

## Two-stage model

- **Calculate SE's intrinsic value per share on 1/1/03**
- $$\text{Terminal Value}_{2006} = \frac{FCFE_{2007}}{r - g} = \frac{3.759}{0.104 - 0.07} = 110.559$$

| | 2002 | 2003 | 2004 | 2005 | 2006 |
|---|---|---|---|---|---|
| FCFE per share | | -0.030 | 1.057 | 2.023 | 2.919 |
| Terminal Value | | | | | 110.559 |
| Total FCFE | | -0.030 | 1.057 | 2.023 | 113.478 |
| Discount factor | | $1.104^{-1}$ | $1.104^{-2}$ | $1.104^{-3}$ | $1.104^{-4}$ |
| PV of cash flows | | -0.027 | 0.867 | 1.504 | 76.390 |
| Total PV | 78.74 | | | | |



Outcome 8.10

## Two-stage model

- **What should be the trailing P/E on 1/1/ 03 and 1/1/07?**
- $$\text{Trailing P/E}_{2003} = \frac{V_{2003}}{EPS_{2002}} = \frac{78.73}{2.40} = 32.8$$
- $$\text{Trailing P/E}_{2007} = \frac{V_{2007}}{EPS_{2006}} = \frac{110.56}{4.494} = 24.6$$



Outcome 8.10

## Three-stage model

- **Marathon Oil Company (MRO) reported FCFF of $745m**
- **Forecast growth rate of FCFF is 8.8% p.a. for the next four years, 7.4%, 6.0% and 4.6% in years 5, 6 and 7, respectively, and 3.2% p.a. thereafter**
- **Capital structure is 20% debt, 80% equity**
- **Cost of debt is 7.1%**
- **Long-term debt is currently $1.518b**
- **Tax rate is 34%**
- **Beta for MRO is 0.90, the risk-free rate is 5.04% and the equity premium is 5.5%**
- **There are 309.39 million shares outstanding**

- **Estimate MRO's WACC, firm value, equity value and value per share**

Outcome 8.10

## Three-stage model

- **Estimate MRO's WACC**
- Required rate of return $= R_F + \beta_i \left[ E(R_M) - R_F \right]$
  $= 0.0504 + (0.9 \times 0.055) = 9.99\%$
- $\text{WACC} = \dfrac{E}{D+E}(r_e) + \dfrac{D}{D+V}(r_d)(1 - \text{Tax Rate})$
  $= (0.80)(0.0999) + (0.20)(0.071)(1 - 0.34) = 8.93\%$

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Outcome 8.10

## Three-stage model

- **Estimate MRO's firm value**

| | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 |
|---|---|---|---|---|---|---|---|---|
| FCFF growth rate | | 8.8% | 8.8% | 8.8% | 8.8% | 7.4% | 6.0% | 4.6% |
| FCFF | 745 | 811 | 882 | 959 | 1044 | 1121 | 1188 | 1243 |
| Terminal value$_{2009}$ | $= \dfrac{FCFF_{2010}}{WACC - g} = \dfrac{FCFF_{2009}(1+g)}{WACC - g} = \dfrac{1243(1.032)}{0.0893 - 0.032} =$ | | | | | | | 22389 |
| Total FCFF | | 811 | 882 | 959 | 1044 | 1121 | 1188 | 23632 |
| PV of FCFF | | 744 | 743 | 742 | 741 | 731 | 711 | 12986 |
| Total PV | 17,398 | | | | | | | |

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Outcome 8.10

## Three-stage model

- **Estimate MRO's equity value**
- Value of equity $=$ Value of firm $-$ Value of debt
  $= 17.398 - 1{,}518 = \$15{,}880$
- **Estimate MRO's value per share**
- Value per share $= \dfrac{\text{Value of equity}}{\text{No of shares}} = \dfrac{15{,}880}{309.39} = \$51.33$

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