# Discounted Cash Flow: Forecasting Free Cash Flows

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# Last Time

## Discounted Cash Flow (DCF)

- Forecast drivers

# This Time

## Discounted Cash Flow (DCF)

- Forecasting free cash flows

# Forecasting Free Cash Flows

FCF = (Revenue – Costs – Depreciation) x (1 – $t_C$)
+ Depreciation – Capital Expenditures
– Change in Net Working Capital

Translate forecast drivers into $ forecasts

# FCF = (Revenue – Costs – Depreciation) x (1 – $t_C$) + Depreciation – Capital Expenditures – Change in Net Working Capital

| | Year | | | | | |
|---|---|---|---|---|---|---|
| **Project Assumptions** | **0 (F2008)** | **1** | **2** | **3** | **4** | **5** |
| **Revenue Forecasts** | | | | | | |
| *Market Forecasts* | | | | | | |
| Initial Market Size (Units, million) | 1.00 | | | | | |
| Market Growth Rate | | 2500.00% | 128.0% | 9.4% | 3.5% | |
| Market Size (Units, million) | 1.0 | 26.0 | 59.3 | 64.9 | 67.1 | |
| (Actual Market Size, Units Mil) | 1.0 | 60.0 | 116.3 | 195.4 | 229.0 | |
| *Dell's Market Share* | | | | | | |
| Initial Market Share | 25.00% | | | | | |
| Market Share Annual Growth Rate | | 5.00% | 5% | 5% | 5% | |
| Market Share | 25.0% | 26.3% | 27.6% | 28.9% | 30.4% | |
| *Pricing Strategy* | | | | | | |
| Initial Unit Price ($/unit) | 200.00 | | | | | |
| Bi-Annual Price Increases ($/unit) | | - | 49.99 | - | 49.99 | |
| Unit Price ($/unit) | 200.00 | 200.00 | 249.99 | 249.99 | 299.98 | |

$$FCF = (\text{Revenue} - \text{Costs} - \text{Depreciation}) \times (1 - t_C) + \text{Depreciation} - \text{Capital Expenditures} - \text{Change in Net Working Capital}$$

| | Year | | | | | |
|---|---|---|---|---|---|---|
| **Project Assumptions** | **0 (F2008)** | **1** | **2** | **3** | **4** | **5** |
| **Revenue Forecasts** | | | | | | |
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$$\text{Revenue} = \text{Market Size} \times \text{Market Share} \times \text{Price}$$

$$FCF = (\text{Revenue} - \text{Costs} - \text{Depreciation}) \times (1 - t_C) + \text{Depreciation} - \text{Capital Expenditures} - \text{Change in Net Working Capital}$$

| | Year | | | | | |
|---|---|---|---|---|---|---|
| **Project Assumptions** | **0 (F2008)** | **1** | **2** | **3** | **4** | **5** |
| **Revenue Forecasts** | | | | | | |
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| Unit Price ($/unit) | 200.00 | 200.00 | 249.99 | 249.99 | 299.98 | |

$$\text{Revenue 1} = 1.0 \times 0.25 \times 200 = 50$$

$$FCF = (\text{Revenue} - \text{Costs} - \text{Depreciation}) \times (1 - t_C) + \text{Depreciation} - \text{Capital Expenditures} - \text{Change in Net Working Capital}$$

| Incremental Earnings Forecasts | Year | | | | | |
|---|---|---|---|---|---|---|
| | 0 | 1 | 2 | 3 | 4 | 5 |
| Sales | | 50.0 | 1,365.0 | 4,084.6 | 4,692.0 | 6,116.9 |

# FCF = (Revenue – Costs – Depreciation) x (1 – $t_C$) + Depreciation – Capital Expenditures – Change in Net Working Capital

| | Year | | | | | |
|---|---|---|---|---|---|---|
| **Project Assumptions** | **0 (F2008)** | **1** | **2** | **3** | **4** | **5** |
| **Operating Expenses** | | | | | | |
| *COGS* | | | | | | |
| COGS / Sales (% Sales) | 80.66% | 80.66% | 80.66% | 80.66% | 80.66% | 80.66% |
| *SG&A* | | | | | | |
| 1% of 2008 Company SG&A ($mil) | | 69.59 | | | | |
| SG&A Expense Growth Rate | | | 25.00% | 25.00% | 25.00% | 25.00% |
| *R&D* | | | | | | |
| R&D Upfront ($mil) | 200.00 | | | | | |
| R&D for Versioning ($mil) | | 25.00 | 25.00 | 25.00 | 25.00 | 25.00 |

# FCF = (Revenue – Costs – Depreciation) x (1 – $t_C$) + Depreciation – Capital Expenditures – Change in Net Working Capital

| Project Assumptions | Year 0 (F2008) | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|---|
| **Operating Expenses** | | | | | | |
| *COGS* | | | | | | |
| COGS / Sales (% Sales) | 80.66% | 80.66% | 80.66% | 80.66% | 80.66% | 80.66% |
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| R&D Upfront ($mil) | 200.00 | | | | | |
| R&D for Versioning ($mil) | | 25.00 | 25.00 | 25.00 | 25.00 | 25.00 |

| Incremental Earnings Forecasts | Year 0 | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|---|
| Sales | | 50.0 | 1,365.0 | 4,084.6 | 4,692.0 | 6,116.9 |

COGS = (COGS / Sales) x Sales

Year 1: 0.8066 x 50.0 = 40.33

# FCF = (Revenue – Costs – Depreciation) x (1 – $t_C$) + Depreciation – Capital Expenditures – Change in Net Working Capital

| | Year | | | | | |
|---|---|---|---|---|---|---|
| **Project Assumptions** | **0 (F2008)** | **1** | **2** | **3** | **4** | **5** |
| **Operating Expenses** | | | | | | |
| *COGS* | | | | | | |
| COGS / Sales (% Sales) | 80.66% | 80.66% | 80.66% | 80.66% | 80.66% | 80.66% |
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| 1% of 2008 Company SG&A ($mil) | | 69.59 | | | | |
| SG&A Expense Growth Rate | | | 25.00% | 25.00% | 25.00% | 25.00% |
| *R&D* | | | | | | |
| R&D Upfront ($mil) | 200.00 | | | | | |
| R&D for Versioning ($mil) | | 25.00 | 25.00 | 25.00 | 25.00 | 25.00 |

| | Year | | | | | |
|---|---|---|---|---|---|---|
| **Incremental Earnings Forecasts** | **0** | **1** | **2** | **3** | **4** | **5** |
| Sales | | 50.0 | 1,365.0 | 4,084.6 | 4,692.0 | 6,116.9 |

| | Year | | | | | |
|---|---|---|---|---|---|---|
| **Incremental Earnings Forecasts** | **0** | **1** | **2** | **3** | **4** | **5** |
| COGS | | 40.3 | 1,101.0 | 3,294.6 | 3,784.6 | 4,933.9 |

# FCF = (Revenue – Costs – Depreciation) x (1 – $t_C$) + Depreciation – Capital Expenditures – Change in Net Working Capital

| Project Assumptions | Year 0 (F2008) | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|---|
| **Operating Expenses** | | | | | | |
| *COGS* | | | | | | |
| COGS / Sales (% Sales) | 80.66% | 80.66% | 80.66% | 80.66% | 80.66% | 80.66% |
| *SG&A* | | | | | | |
| 1% of 2008 Company SG&A ($mil) | | 69.59 | | | | |
| SG&A Expense Growth Rate | | | 25.00% | 25.00% | 25.00% | 25.00% |
| *R&D* | | | | | | |
| R&D Upfront ($mil) | 200.00 | | | | | |
| R&D for Versioning ($mil) | | 25.00 | 25.00 | 25.00 | 25.00 | 25.00 |

Year 1: SG&A = 1% of '08 SG&A
= 0.01 x $6,959 = $69.6

Year 2 – 5: SG&A = 25% Annual Growth Rate
= $69.59 x (1+0.25) = $87.0

# FCF = (Revenue – Costs – Depreciation) x (1 – $t_C$) + Depreciation – Capital Expenditures – Change in Net Working Capital

| | Year | | | | | |
|---|---|---|---|---|---|---|
| **Project Assumptions** | **0 (F2008)** | **1** | **2** | **3** | **4** | **5** |
| **Operating Expenses** | | | | | | |
| *COGS* | | | | | | |
| COGS / Sales (% Sales) | 80.66% | 80.66% | 80.66% | 80.66% | 80.66% | 80.66% |
| *SG&A* | | | | | | |
| 1% of 2008 Company SG&A ($mil) | | 69.59 | | | | |
| SG&A Expense Growth Rate | | | 25.00% | 25.00% | 25.00% | 25.00% |
| *R&D* | | | | | | |
| R&D Upfront ($mil) | 200.00 | | | | | |
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| | Year | | | | | |
|---|---|---|---|---|---|---|
| **Incremental Earnings Forecasts** | **0** | **1** | **2** | **3** | **4** | **5** |
| SG&A | | 69.6 | 87.0 | 108.7 | 135.9 | 169.9 |

# FCF = (Revenue – Costs – Depreciation) x (1 – $t_C$) + Depreciation – Capital Expenditures – Change in Net Working Capital

| | Year | | | | | |
|---|---|---|---|---|---|---|
| **Project Assumptions** | **0 (F2008)** | **1** | **2** | **3** | **4** | **5** |
| **Operating Expenses** | | | | | | |
| *COGS* | | | | | | |
| COGS / Sales (% Sales) | 80.66% | 80.66% | 80.66% | 80.66% | 80.66% | 80.66% |
| *SG&A* | | | | | | |
| 1% of 2008 Company SG&A ($mil) | | 69.59 | | | | |
| SG&A Expense Growth Rate | | | 25.00% | 25.00% | 25.00% | 25.00% |
| *R&D* | | | | | | |
| R&D Upfront ($mil) | 200.00 | | | | | |
| R&D for Versioning ($mil) | | 25.00 | 25.00 | 25.00 | 25.00 | 25.00 |

| | Year | | | | | |
|---|---|---|---|---|---|---|
| **Incremental Earnings Forecasts** | **0** | **1** | **2** | **3** | **4** | **5** |
| R&D | 200.0 | 25.0 | 25.0 | 25.0 | 25.0 | 25.0 |

FCF = (Revenue – Costs – Depreciation) x (1 – $t_C$)
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– Change in Net Working Capital

| | Year | | | | | |
|---|---|---|---|---|---|---|
| **Incremental Earnings Forecasts** | **0** | **1** | **2** | **3** | **4** | **5** |
| Sales | | 50.0 | 1,365.0 | 4,084.6 | 4,692.0 | 6,116.9 |
| COGS | | 40.3 | 1,101.0 | 3,294.6 | 3,784.6 | 4,933.9 |
| *Gross Profit = (28) - (29)* | 0.0 | 9.7 | 264.0 | 790.0 | 907.4 | 1,183.0 |
| SG&A | | 69.6 | 87.0 | 108.7 | 135.9 | 169.9 |
| R&D | 200.0 | 25.0 | 25.0 | 25.0 | 25.0 | 25.0 |
| *EBITDA = (30) - (31) - (32)* | -200.0 | -84.9 | 152.0 | 656.2 | 746.5 | 988.1 |

$$FCF = (Revenue - Costs - Depreciation) \times (1 - t_C) + Depreciation - Capital\ Expenditures - Change\ in\ Net\ Working\ Capital$$

| | Year | | | | | |
|---|---|---|---|---|---|---|
| **Project Assumptions** | **0 (F2008)** | **1** | **2** | **3** | **4** | **5** |
| **Capital Expenditures & PP&E Information** | | | | | | |
| Initial Investment (Fixed Cost, $mil) | 227.70 | | | | | |
| Future Investment (% of initial Investment) | | 10.0% | | | | |
| Future Investment (Annual Growth) | | | 5.0% | 1.0% | 1.0% | 1.0% |

$$FCF = (Revenue - Costs - Depreciation) \times (1 - t_C) + Depreciation - Capital\ Expenditures - Change\ in\ Net\ Working\ Capital$$

| | Year | | | | | |
|---|---|---|---|---|---|---|
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Year 0: Initial investment = 227.7

$$FCF = (Revenue - Costs - Depreciation) \times (1 - t_C) + Depreciation - Capital\ Expenditures - Change\ in\ Net\ Working\ Capital$$

| | Year | | | | | |
|---|---|---|---|---|---|---|
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Year 0: Initial investment = 227.7

Year 1: 10% of initial investment = 0.10 x $227.7 = $22.77

FCF = (Revenue – Costs – Depreciation) x (1 – $t_C$)
+ Depreciation – Capital Expenditures
– Change in Net Working Capital

| | Year | | | | | |
|---|---|---|---|---|---|---|
| **Project Assumptions** | **0 (F2008)** | **1** | **2** | **3** | **4** | **5** |
| **Capital Expenditures & PP&E Information** | | | | | | |
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Year 0: Initial investment = 227.7

Year 1: 10% of initial investment = 0.10 x $227.7 = $22.77

Year 2: 5% annual growth = $22.77 x (1+0.05) = $23.9

$$FCF = (Revenue - Costs - Depreciation) \times (1 - t_C) + Depreciation - Capital\ Expenditures - Change\ in\ Net\ Working\ Capital$$

| | Year | | | | | |
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Year 0: Initial investment = 227.7

Year 1: 10% of initial investment = 0.10 x $227.7 = $22.77

Year 2: 5% annual growth = $22.77 x (1+0.05) = $23.9

Year 3-5: 1% annual growth = $23.9 x (1+0.01) = $24.1

$$FCF = (Revenue - Costs - Depreciation) \times (1 - t_C) + Depreciation - Capital\ Expenditures - Change\ in\ Net\ Working\ Capital$$

| | Year | | | | | |
|---|---|---|---|---|---|---|
| **Project Assumptions** | **0 (F2008)** | **1** | **2** | **3** | **4** | **5** |
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| Initial Investment (Fixed Cost, $mil) | 227.70 | | | | | |
| Future Investment (% of initial Investment) | | 10.0% | | | | |
| Future Investment (Annual Growth) | | | 5.0% | 1.0% | 1.0% | 1.0% |

| | Year | | | | | |
|---|---|---|---|---|---|---|
| **Capital Expenditure Forecasts** | **0** | **1** | **2** | **3** | **4** | **5** |
| Project CapEx | 227.7 | 22.8 | 23.9 | 24.1 | 24.4 | 24.6 |

FCF = (Revenue – Costs – Depreciation) x (1 – $t_C$)
+ Depreciation – Capital Expenditures
– Change in Net Working Capital

| Capital Expenditure Forecasts | Year | | | | | |
|---|---|---|---|---|---|---|
| | 0 | 1 | 2 | 3 | 4 | 5 |
| Project CapEx | 227.7 | 22.8 | 23.9 | 24.1 | 24.4 | 24.6 |

+

Straight line depreciation over 5 years

$$FCF = (Revenue - Costs - Depreciation) \times (1 - t_C) + Depreciation - Capital\ Expenditures - Change\ in\ Net\ Working\ Capital$$

| Capital Expenditure Forecasts | Year 0 | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|---|
| Project CapEx | 227.7 | 22.8 | 23.9 | 24.1 | 24.4 | 24.6 |
| Accumulated CapEx | 227.7 | 250.5 | 274.4 | 298.5 | 322.9 | 347.5 |
| Depreciation | | 45.5 | 50.1 | 54.9 | 59.7 | 64.6 |

Year 1: $227.7 / 5 = $45.5

$$FCF = (Revenue - Costs - Depreciation) \times (1 - t_C) + Depreciation - Capital\ Expenditures - Change\ in\ Net\ Working\ Capital$$

| Capital Expenditure Forecasts | Year 0 | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|---|
| Project CapEx | 227.7 | 22.8 | 23.9 | 24.1 | 24.4 | 24.6 |
| Accumulated CapEx | 227.7 | 250.5 | 274.4 | 298.5 | 322.9 | 347.5 |
| Depreciation | | 45.5 | 50.1 | 54.9 | 59.7 | 64.6 |

Year 1: 227.7 / 5 = 45.5

Year 2: 250.5 / 5 = 50.1

FCF = (Revenue – Costs – Depreciation) x (1 – $t_C$)
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– Change in Net Working Capital

| Capital Expenditure Forecasts | Year | | | | | |
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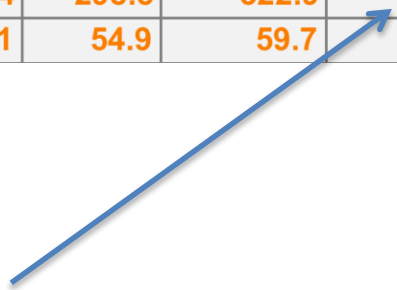

What happens to all of that physical capital?

FCF = (Revenue – Costs – Depreciation) x (1 – $t_C$)
+ Depreciation – Capital Expenditures
– Change in Net Working Capital

| Capital Expenditure Forecasts | Year 0 | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|---|
| Project CapEx | 227.7 | 22.8 | 23.9 | 24.1 | 24.4 | 24.6 |
| Accumulated CapEx | 227.7 | 250.5 | 274.4 | 298.5 | 322.9 | 347.5 |
| Depreciation | | 45.5 | 50.1 | 54.9 | 59.7 | 64.6 |
| Book Value of CapEx | | | | | | 72.8 |
| Liquidation Value (LV) | | | | | | 36.4 |
| After tax proceeds from asset sale | | | | | | 45.6 |

Book Value = Accum CapEx – Accum Depreciation
= 347.5 – 274.8
= 72.8

FCF = (Revenue – Costs – Depreciation) x (1 – $t_C$)
+ Depreciation – Capital Expenditures
– Change in Net Working Capital

| Capital Expenditure Forecasts | Year 0 | 1 | 2 | 3 | 4 | 5 |
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| Project CapEx | 227.7 | 22.8 | 23.9 | 24.1 | 24.4 | 24.6 |
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| Book Value of CapEx | | | | | | 72.8 |
| Liquidation Value (LV) | | | | | | 36.4 |
| After tax proceeds from asset sale | | | | | | 45.6 |

LV = Book Value x Recovery Rate
= 72.8 x 0.50
= 36.4

FCF = (Revenue – Costs – Depreciation) x (1 – $t_C$)
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– Change in Net Working Capital

| Capital Expenditure Forecasts | Year 0 | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|---|
| Project CapEx | 227.7 | 22.8 | 23.9 | 24.1 | 24.4 | 24.6 |
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| Depreciation | | 45.5 | 50.1 | 54.9 | 59.7 | 64.6 |
| Book Value of CapEx | | | | | | 72.8 |
| Liquidation Value (LV) | | | | | | 36.4 |
| After tax proceeds from asset sale | | | | | | 45.6 |

After-tax proceeds = LV – (LV – Book Value) x Tax Rate
= 36.4 – (36.4 – 72.8) x 0.255
= 45.6

FCF = (Revenue – Costs – Depreciation) x (1 – $t_C$)
+ Depreciation – Capital Expenditures
– Change in Net Working Capital

| Capital Expenditure Forecasts | Year 0 | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|---|
| Project CapEx | 227.7 | 22.8 | 23.9 | 24.1 | 24.4 | 24.6 |
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| Depreciation | | 45.5 | 50.1 | 54.9 | 59.7 | 64.6 |
| Book Value of CapEx | | | | | | 72.8 |
| Liquidation Value (LV) | | | | | | 36.4 |
| After tax proceeds from asset sale | | | | | | 45.6 |
| Net Project CapEx | 227.7 | 22.8 | 23.9 | 24.1 | 24.4 | -21.0 |

Year 5: 24.6 – 45.6 = -21.0

FCF = (Revenue – Costs – Depreciation) x (1 – $t_C$)
+ Depreciation – Capital Expenditures
– Change in Net Working Capital

Net Working Capital = Cash + Inventory + AR – AP

# FCF = (Revenue – Costs – Depreciation) x (1 – $t_C$) + Depreciation – Capital Expenditures – Change in Net Working Capital

| | Year | | | | | |
|---|---|---|---|---|---|---|
| **Project Assumptions** | **0 (F2008)** | **1** | **2** | **3** | **4** | **5** |
| **Working Capital Assumptions** | | | | | | |
| *Cash Requirements* | | | | | | |
| % of SG&A | 50.00% | 50% | 50% | 50% | 50% | 50% |
| % R&D Expenditures | 100.00% | 100% | 100% | 100% | 100% | 100% |
| *Inventory* | | | | | | |
| Inventory Days (365 x Inventory / COGS) | 7.58 | 7.58 | 7.58 | 7.58 | 7.58 | 7.58 |
| Excess Inventory liquidation value (% of Inventory Cost) | | | | | | 25.00% |
| *Accounts Receivable* | | | | | | |
| Days Receivable (365 x Accounts Receivable / Sales) | 38.49 | 38.49 | 38.49 | 38.49 | 38.49 | 38.49 |
| *Accounts Payable* | | | | | | |
| Days Payable (365 x Accounts Payable / COGS) | 61.54 | 61.54 | 61.54 | 61.54 | 61.54 | 61.54 |

$$FCF = (Revenue - Costs - Depreciation) \times (1 - t_C) + Depreciation - Capital\ Expenditures - Change\ in\ Net\ Working\ Capital$$

| | Year | | | | | |
|---|---|---|---|---|---|---|
| **Project Assumptions** | **0 (F2008)** | **1** | **2** | **3** | **4** | **5** |
| **Working Capital Assumptions** | | | | | | |
| *Cash Requirements* | | | | | | |
| % of SG&A | 50.00% | 50% | 50% | 50% | 50% | 50% |
| % R&D Expenditures | 100.00% | 100% | 100% | 100% | 100% | 100% |

# FCF = (Revenue – Costs – Depreciation) x (1 – $t_C$) + Depreciation – Capital Expenditures – Change in Net Working Capital

| | Year | | | | | |
|---|---|---|---|---|---|---|
| **Project Assumptions** | **0 (F2008)** | **1** | **2** | **3** | **4** | **5** |
| **Working Capital Assumptions** | | | | | | |
| *Cash Requirements* | | | | | | |
| % of SG&A | 50.00% | 50% | 50% | 50% | 50% | 50% |
| % R&D Expenditures | 100.00% | 100% | 100% | 100% | 100% | 100% |

| | Year | | | | | |
|---|---|---|---|---|---|---|
| **Incremental Earnings Forecasts** | **0** | **1** | **2** | **3** | **4** | **5** |
| SG&A | | 69.6 | 87.0 | 108.7 | 135.9 | 169.9 |
| R&D | 200.0 | 25.0 | 25.0 | 25.0 | 25.0 | 25.0 |

Cash for SG&A: 50% of SG&A

Year 1: 0.50 x $69.6 = $34.8

$$FCF = (Revenue - Costs - Depreciation) \times (1 - t_C) + Depreciation - Capital\ Expenditures - Change\ in\ Net\ Working\ Capital$$

| | Year | | | | | |
|---|---|---|---|---|---|---|
| **Project Assumptions** | **0 (F2008)** | **1** | **2** | **3** | **4** | **5** |
| **Working Capital Assumptions** | | | | | | |
| *Cash Requirements* | | | | | | |
| % of SG&A | 50.00% | 50% | 50% | 50% | 50% | 50% |
| % R&D Expenditures | 100.00% | 100% | 100% | 100% | 100% | 100% |

| | Year | | | | | |
|---|---|---|---|---|---|---|
| **Incremental Earnings Forecasts** | **0** | **1** | **2** | **3** | **4** | **5** |
| SG&A | | 69.6 | 87.0 | 108.7 | 135.9 | 169.9 |
| R&D | 200.0 | 25.0 | 25.0 | 25.0 | 25.0 | 25.0 |

Cash for SG&A: 50% of SG&A

Year 1: 0.50 x $69.6 = $34.8

Cash for R&D: 100% of R&D

Year 1: 1.00 x $25.0 = $25.0

# FCF = (Revenue – Costs – Depreciation) x (1 – $t_C$) + Depreciation – Capital Expenditures – Change in Net Working Capital

| | Year | | | | | |
|---|---|---|---|---|---|---|
| **Project Assumptions** | **0 (F2008)** | **1** | **2** | **3** | **4** | **5** |
| **Working Capital Assumptions** | | | | | | |
| *Cash Requirements* | | | | | | |
| % of SG&A | 50.00% | 50% | 50% | 50% | 50% | 50% |
| % R&D Expenditures | 100.00% | 100% | 100% | 100% | 100% | 100% |

| | Year | | | | | |
|---|---|---|---|---|---|---|
| **Incremental Earnings Forecasts** | **0** | **1** | **2** | **3** | **4** | **5** |
| SG&A | | 69.6 | 87.0 | 108.7 | 135.9 | 169.9 |
| R&D | 200.0 | 25.0 | 25.0 | 25.0 | 25.0 | 25.0 |

| | Year | | | | | |
|---|---|---|---|---|---|---|
| **Working Capital Forecasts** | **0** | **1** | **2** | **3** | **4** | **5** |
| Cash Requirements - SG&A Funding | | 34.8 | 43.5 | 54.4 | 68.0 | 84.9 |
| Cash Requirements - R&D Funding | | 25.0 | 25.0 | 25.0 | 25.0 | 25.0 |
| *Cash* | | 59.8 | 68.5 | 79.4 | 93.0 | 109.9 |

# FCF = (Revenue – Costs – Depreciation) x (1 – $t_C$) + Depreciation – Capital Expenditures – Change in Net Working Capital

| | Year | | | | | |
|---|---|---|---|---|---|---|
| **Project Assumptions** | **0 (F2008)** | **1** | **2** | **3** | **4** | **5** |
| *Inventory* | | | | | | |
| Inventory Days (365 x Inventory / COGS) | 7.58 | 7.58 | 7.58 | 7.58 | 7.58 | 7.58 |
| Excess Inventory liquidation value (% of Inventory Cost) | | | | | | 25.00% |

# FCF = (Revenue – Costs – Depreciation) x (1 – $t_C$) + Depreciation – Capital Expenditures – Change in Net Working Capital

| | Year | | | | | |
|---|---|---|---|---|---|---|
| **Project Assumptions** | **0 (F2008)** | **1** | **2** | **3** | **4** | **5** |
| *Inventory* | | | | | | |
| Inventory Days (365 x Inventory / COGS) | 7.58 | 7.58 | 7.58 | 7.58 | 7.58 | 7.58 |
| Excess Inventory liquidation value (% of Inventory Cost) | | | | | | 25.00% |

| | Year | | | | | |
|---|---|---|---|---|---|---|
| **Incremental Earnings Forecasts** | **0** | **1** | **2** | **3** | **4** | **5** |
| COGS | | 40.3 | 1,101.0 | 3,294.6 | 3,784.6 | 4,933.9 |

FCF = (Revenue – Costs – Depreciation) x (1 – $t_C$)
+ Depreciation – Capital Expenditures
– Change in Net Working Capital

| | Year | | | | | |
|---|---|---|---|---|---|---|
| **Project Assumptions** | **0 (F2008)** | **1** | **2** | **3** | **4** | **5** |
| *Inventory* | | | | | | |
| Inventory Days (365 x Inventory / COGS) | 7.58 | 7.58 | 7.58 | 7.58 | 7.58 | 7.58 |
| Excess Inventory liquidation value (% of Inventory Cost) | | | | | | 25.00% |

| | Year | | | | | |
|---|---|---|---|---|---|---|
| **Incremental Earnings Forecasts** | **0** | **1** | **2** | **3** | **4** | **5** |
| COGS | | 40.3 | 1,101.0 | 3,294.6 | 3,784.6 | 4,933.9 |

Inventory = Inventory Days x COGS / 365

Year 1: Inventory = 7.58 x $40.3 / 365 = $0.837

# FCF = (Revenue – Costs – Depreciation) x (1 – $t_C$) + Depreciation – Capital Expenditures – Change in Net Working Capital

| | Year | | | | | |
|---|---|---|---|---|---|---|
| **Project Assumptions** | **0 (F2008)** | **1** | **2** | **3** | **4** | **5** |
| *Inventory* | | | | | | |
| Inventory Days (365 x Inventory / COGS) | 7.58 | 7.58 | 7.58 | 7.58 | 7.58 | 7.58 |
| Excess Inventory liquidation value (% of Inventory Cost) | | | | | | 25.00% |

| | Year | | | | | |
|---|---|---|---|---|---|---|
| **Incremental Earnings Forecasts** | **0** | **1** | **2** | **3** | **4** | **5** |
| COGS | | 40.3 | 1,101.0 | 3,294.6 | 3,784.6 | 4,933.9 |

| | Year | | | | | |
|---|---|---|---|---|---|---|
| **Working Capital Forecasts** | **0** | **1** | **2** | **3** | **4** | **5** |
| *Inventory* | | 0.8 | 22.9 | 68.4 | 78.6 | 102.5 |

$$FCF = (Revenue - Costs - Depreciation) \times (1 - t_C) + Depreciation - Capital\ Expenditures - Change\ in\ Net\ Working\ Capital$$

| | Year | | | | | |
|---|---|---|---|---|---|---|
| **Working Capital Forecasts** | 0 | 1 | 2 | 3 | 4 | 5 |
| *Accounts Receivable* | | | | | | |
| Days Receivable (365 x Accounts Receivable / Sales) | 38.49 | 38.49 | 38.49 | 38.49 | 38.49 | 38.49 |

$$FCF = (Revenue - Costs - Depreciation) \times (1 - t_C) + Depreciation - Capital\ Expenditures - Change\ in\ Net\ Working\ Capital$$

| Working Capital Forecasts | Year 0 | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|---|
| *Accounts Receivable* | | | | | | |
| Days Receivable (365 x Accounts Receivable / Sales) | 38.49 | 38.49 | 38.49 | 38.49 | 38.49 | 38.49 |

| Incremental Earnings Forecasts | Year 0 | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|---|
| Sales | | 50.0 | 1,365.0 | 4,084.6 | 4,692.0 | 6,116.9 |

AR = AR Days x Sales / 365

Year 1: AR = 38.49 x $50.0 / 365 = $5.272

# FCF = (Revenue – Costs – Depreciation) x (1 – $t_C$) + Depreciation – Capital Expenditures – Change in Net Working Capital

| Working Capital Forecasts | Year 0 | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|---|
| *Accounts Receivable* | | | | | | |
| Days Receivable (365 x Accounts Receivable / Sales) | 38.49 | 38.49 | 38.49 | 38.49 | 38.49 | 38.49 |

| Incremental Earnings Forecasts | Year 0 | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|---|
| Sales | | 50.0 | 1,365.0 | 4,084.6 | 4,692.0 | 6,116.9 |

| Working Capital Forecasts | Year 0 | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|---|
| *Accounts Receivable* | | 5.3 | 143.9 | 430.7 | 494.8 | 645.0 |

$$FCF = (Revenue - Costs - Depreciation) \times (1 - t_C) + Depreciation - Capital\ Expenditures - Change\ in\ Net\ Working\ Capital$$

| | Year | | | | | |
|---|---|---|---|---|---|---|
| **Working Capital Forecasts** | 0 | 1 | 2 | 3 | 4 | 5 |
| *Accounts Payable* | | | | | | |
| Days Payable (365 x Accounts Payable / COGS) | 61.54 | 61.54 | 61.54 | 61.54 | 61.54 | 61.54 |

FCF = (Revenue – Costs – Depreciation) x (1 – $t_C$)
+ Depreciation – Capital Expenditures
– Change in Net Working Capital

| Working Capital Forecasts | Year 0 | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|---|
| *Accounts Payable* | | | | | | |
| Days Payable (365 x Accounts Payable / COGS) | 61.54 | 61.54 | 61.54 | 61.54 | 61.54 | 61.54 |

| Incremental Earnings Forecasts | Year 0 | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|---|
| COGS | | 40.3 | 1,101.0 | 3,294.6 | 3,784.6 | 4,933.9 |

AP = AP Days x COGS / 365

Year 1: AR = 61.54 x $40.3 / 365 = $6.794

# FCF = (Revenue – Costs – Depreciation) x (1 – $t_C$) + Depreciation – Capital Expenditures – Change in Net Working Capital

| Working Capital Forecasts | Year 0 | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|---|
| *Accounts Payable* | | | | | | |
| Days Payable (365 x Accounts Payable / COGS) | 61.54 | 61.54 | 61.54 | 61.54 | 61.54 | 61.54 |

| Incremental Earnings Forecasts | Year 0 | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|---|
| COGS | | 40.3 | 1,101.0 | 3,294.6 | 3,784.6 | 4,933.9 |

| Incremental Earnings Forecasts | Year 0 | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|---|
| *Acounts Payable* | | 6.8 | 185.6 | 555.5 | 638.1 | 831.9 |

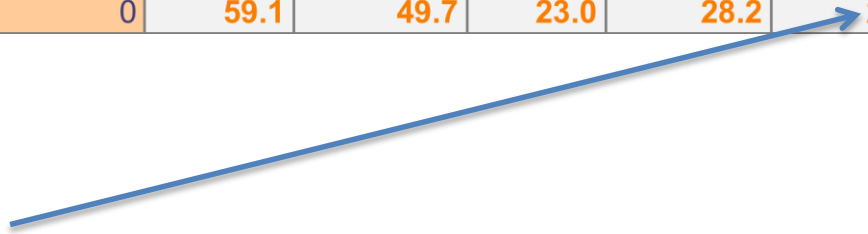
$$FCF = (Revenue - Costs - Depreciation) \times (1 - t_C) + Depreciation - Capital\ Expenditures - Change\ in\ Net\ Working\ Capital$$

| | Year | | | | | |
|---|---|---|---|---|---|---|
| **Working Capital Forecasts** | 0 | 1 | 2 | 3 | 4 | 5 |
| Cash Requirements - SG&A Funding | | 34.8 | 43.5 | 54.4 | 68.0 | 84.9 |
| Cash Requirements - R&D Funding | | 25.0 | 25.0 | 25.0 | 25.0 | 25.0 |
| *Cash* | | 59.8 | 68.5 | 79.4 | 93.0 | 109.9 |
| *Inventory* | | 0.8 | 22.9 | 68.4 | 78.6 | 102.5 |
| *Accounts Receivable* | | 5.3 | 143.9 | 430.7 | 494.8 | 645.0 |
| *Acounts Payable* | | 6.8 | 185.6 | 555.5 | 638.1 | 831.9 |
| *Net Working Capital* | 0 | 59.1 | 49.7 | 23.0 | 28.2 | 25.6 |

$$Net\ Working\ Capital = Cash + Inventory + AR - AP$$

FCF = (Revenue – Costs – Depreciation) x (1 – $t_C$)
+ Depreciation – Capital Expenditures
– Change in Net Working Capital

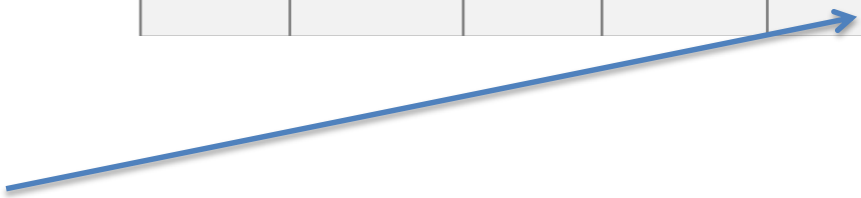
| | Year | | | | | |
|---|---|---|---|---|---|---|
| **Working Capital Forecasts** | 0 | 1 | 2 | 3 | 4 | 5 |
| Cash Requirements - SG&A Funding | | 34.8 | 43.5 | 54.4 | 68.0 | 84.9 |
| Cash Requirements - R&D Funding | | 25.0 | 25.0 | 25.0 | 25.0 | 25.0 |
| *Cash* | | 59.8 | 68.5 | 79.4 | 93.0 | 109.9 |
| *Inventory* | | 0.8 | 22.9 | 68.4 | 78.6 | 102.5 |
| *Accounts Receivable* | | 5.3 | 143.9 | 430.7 | 494.8 | 645.0 |
| *Acounts Payable* | | 6.8 | 185.6 | 555.5 | 638.1 | 831.9 |
| *Net Working Capital* | 0 | 59.1 | 49.7 | 23.0 | 28.2 | 25.6 |



What happens to this working capital?

FCF = (Revenue – Costs – Depreciation) x (1 – $t_C$)
+ Depreciation – Capital Expenditures
– Change in Net Working Capital

| | Year | | | | | |
|---|---|---|---|---|---|---|
| **Working Capital Forecasts** | 0 | 1 | 2 | 3 | 4 | 5 |
| Cash Requirements - SG&A Funding | | 34.8 | 43.5 | 54.4 | 68.0 | 84.9 |
| Cash Requirements - R&D Funding | | 25.0 | 25.0 | 25.0 | 25.0 | 25.0 |
| *Cash* | | 59.8 | 68.5 | 79.4 | 93.0 | 109.9 |
| *Inventory* | | 0.8 | 22.9 | 68.4 | 78.6 | 102.5 |
| *Accounts Receivable* | | 5.3 | 143.9 | 430.7 | 494.8 | 645.0 |
| *Acounts Payable* | | 6.8 | 185.6 | 555.5 | 638.1 | 831.9 |
| *Net Working Capital* | 0 | 59.1 | 49.7 | 23.0 | 28.2 | 25.6 |
| Recovered NWC at end of Project | | | | | | 51.3 |



(Most of) it is recovered!

FCF = (Revenue – Costs – Depreciation) x (1 – $t_C$)
+ Depreciation – Capital Expenditures
– Change in Net Working Capital

| | Year | | | | | |
|---|---|---|---|---|---|---|
| **Working Capital Forecasts** | 0 | 1 | 2 | 3 | 4 | 5 |
| Cash Requirements - SG&A Funding | | 34.8 | 43.5 | 54.4 | 68.0 | 84.9 |
| Cash Requirements - R&D Funding | | 25.0 | 25.0 | 25.0 | 25.0 | 25.0 |
| *Cash* | | 59.8 | 68.5 | 79.4 | 93.0 | 109.9 |
| *Inventory* | | 0.8 | 22.9 | 68.4 | 78.6 | 102.5 |
| *Accounts Receivable* | | 5.3 | 143.9 | 430.7 | 494.8 | 645.0 |
| *Acounts Payable* | | 6.8 | 185.6 | 555.5 | 638.1 | 831.9 |
| *Net Working Capital* | 0 | 59.1 | 49.7 | 23.0 | 28.2 | 25.6 |
| Recovered NWC at end of Project | | | | | | 51.3 |

(Most of) it is recovered!

– Cash – Inventory x Recovery Rate – AR + AP
Year 5: – 109.90 – 102.5 x 0.25 – 645 + 831.9 = 51.375

FCF = (Revenue – Costs – Depreciation) x (1 – $t_C$)
+ Depreciation – Capital Expenditures
– Change in Net Working Capital

| | Year | | | | | |
|---|---|---|---|---|---|---|
| **Working Capital Forecasts** | 0 | 1 | 2 | 3 | 4 | 5 |
| Cash Requirements - SG&A Funding | | 34.8 | 43.5 | 54.4 | 68.0 | 84.9 |
| Cash Requirements - R&D Funding | | 25.0 | 25.0 | 25.0 | 25.0 | 25.0 |
| *Cash* | | 59.8 | 68.5 | 79.4 | 93.0 | 109.9 |
| *Inventory* | | 0.8 | 22.9 | 68.4 | 78.6 | 102.5 |
| *Accounts Receivable* | | 5.3 | 143.9 | 430.7 | 494.8 | 645.0 |
| *Acounts Payable* | | 6.8 | 185.6 | 555.5 | 638.1 | 831.9 |
| *Net Working Capital* | 0 | 59.1 | 49.7 | 23.0 | 28.2 | 25.6 |
| Recovered NWC at end of Project | | | | | | 51.3 |
| *Change in NWC* | | 59.1 | -9.4 | -26.6 | 5.2 | 48.6 |

Change in NWC = ΔNWC = NWC(t) – NWC(t-1)

$$FCF = (\text{Revenue} - \text{Costs} - \text{Depreciation}) \times (1 - t_C) + \text{Depreciation} - \text{Capital Expenditures} - \text{Change in Net Working Capital}$$

We have all the pieces. Organize into a useful (and familiar) format

# (Quasi-) Income Statement

| Incremental Earnings Forecasts | Year 0 | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|---|
| Sales | | 50.0 | 1,365.0 | 4,084.6 | 4,692.0 | 6,116.9 |
| COGS | | 40.3 | 1,101.0 | 3,294.6 | 3,784.6 | 4,933.9 |
| *Gross Profit = (28) - (29)* | 0.0 | 9.7 | 264.0 | 790.0 | 907.4 | 1,183.0 |
| SG&A | | 69.6 | 87.0 | 108.7 | 135.9 | 169.9 |
| R&D | 200.0 | 25.0 | 25.0 | 25.0 | 25.0 | 25.0 |
| *EBITDA = (30) - (31) - (32)* | -200.0 | -84.9 | 152.0 | 656.2 | 746.5 | 988.1 |
| Depreciation | | 45.5 | 50.1 | 54.9 | 59.7 | 64.6 |
| *EBIT = (33) - (34)* | -200.0 | -130.5 | 101.9 | 601.4 | 686.8 | 923.5 |
| Taxes | -50.9 | -33.2 | 25.9 | 153.0 | 174.8 | 235.0 |
| *NOPAT (35) - (36) (a.k.a. EBIAT, Unlevered Net Income)* | -149.1 | -97.3 | 76.0 | 448.3 | 512.0 | 688.5 |

# (Quasi-) Income Statement

| Incremental Earnings Forecasts | Year 0 | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|---|
| Sales | | 50.0 | 1,365.0 | 4,084.6 | 4,692.0 | 6,116.9 |
| COGS | | 40.3 | 1,101.0 | 3,294.6 | 3,784.6 | 4,933.9 |
| *Gross Profit = (28) - (29)* | 0.0 | 9.7 | 264.0 | 790.0 | 907.4 | 1,183.0 |
| SG&A | | 69.6 | 87.0 | 108.7 | 135.9 | 169.9 |
| R&D | 200.0 | 25.0 | 25.0 | 25.0 | 25.0 | 25.0 |
| *EBITDA = (30) - (31) - (32)* | -200.0 | -84.9 | 152.0 | 656.2 | 746.5 | 988.1 |
| Depreciation | | 45.5 | 50.1 | 54.9 | 59.7 | 64.6 |
| *EBIT = (33) - (34)* | -200.0 | -130.5 | 101.9 | 601.4 | 686.8 | 923.5 |
| Taxes | -50.9 | -33.2 | 25.9 | 153.0 | 174.8 | 235.0 |
| *NOPAT (35) - (36) (a.k.a. EBIAT, Unlevered Net Income)* | -149.1 | -97.3 | 76.0 | 448.3 | 512.0 | 688.5 |

NOPAT

$$FCF = (\text{Revenue} - \text{Costs} - \text{Depreciation}) \times (1 - t_C) + \text{Depreciation} - \text{Capital Expenditures} - \text{Change in Net Working Capital}$$

FCF = (Revenue – Costs – Depreciation) x (1 – $t_C$)
+ Depreciation – Capital Expenditures
– Change in Net Working Capital

| | Year | | | | | |
|---|---|---|---|---|---|---|
| **Free Cash Flow Forecasts** | **0** | **1** | **2** | **3** | **4** | **5** |
| *NOPAT (Unlevered Net Income, EBIAT)* | -149.1 | -97.3 | 76.0 | 448.3 | 512.0 | 688.5 |
| Depreciation | | 45.5 | 50.1 | 54.9 | 59.7 | 64.6 |
| Capital Expenditures | 227.7 | 22.8 | 23.9 | 24.1 | 24.4 | -21.0 |
| Changes in NWC | | 59.1 | -9.4 | -26.6 | 5.2 | 48.6 |
| *Free Cash Flows = (38) +(39) - (40) - (41)* | **-376.8** | **-133.6** | **111.6** | **505.7** | **542.1** | **725.5** |

# Other Free Cash Flow Considerations

- Opportunity Costs (Alternative uses of resources)
- Project Externalities (Cannibalization, spillovers,)
- Sunk Costs (Ignore)
- Other non-cash items (E.g., amortization)
- Salvage values (Assets do not disappear)
- Execution Risk (Idiosyncratic)
- Cash flow frequency (Project dependent)

# Summary

# Lessons

- Forecasting free cash flows is a matter of converting our forecast drivers into dollar forecasts

- One of the two basic inputs into a DCF

# Coming up next

- Discounted Cash Flow (DCF)
  - Decision Criteria